ARMED FORCES CHEMICAL JOURNAL

4

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THE Armed Forces Chemical Association is a patriotic, educational, scientific, nonpolitical and nonprofit-making organization of citizens of the United States of America dedicated to scientific and industrial preparedness for the common defense in the fields of chemical, biological, radiological and related technology, commonly referred to as chemicals. Objectives of the Association are to encourage chemical research and development, among private, industrial, educational, and research organizations in cooperation with the agencies of the Department of Defense. To bring to the people of our country the knowledge for the necessity of scientific and industrial preparedness; and to encourage adequate military training throughout the Nation and the upbuilding of adequate enlisted and commissioned Reserves; to assist in developing and maintaining adequate personnel, both commissioned and enlisted, for the requirements of the Military Establishment and Civil Defense in the event of an emergency. In pursuit of these objectives, the Association will provide, when required, the services of competent committees to investigate and report on special chemical subjects; will promote mutual understanding between American scientists, inventors, engineers, and manufacturers in civil life, and personnel of the Armed Forces. And, the Association will cooperate with all agencies of the Government in planning mobilization and untilization of the Nation's scientific and industrial resources for the national security.

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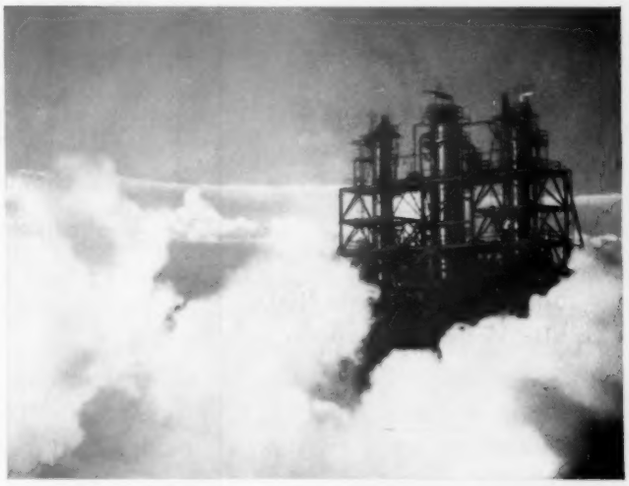

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ENGINEERS AND CONSTRUCTORS FOR INDUSTRY

Saline Water Conversion Moves a Major Step Closer to Large-Scale Operation

Department of The Interior Selects Lummus to Evaluate Freezing Processes and Design Demonstration Plant

The Lummus Company has been selected as the architect-engineer for the East Coast saline water conversion plant which is to be erected at Wrightsville Beach, North Carolina, Secretary of the Interior Stewart L. Udall announced recently. The Wrightsville plant is the fifth in a series of five plants authorized in 1958 by Congress to demonstrate the engineering, reliability, and economic potentials of the most promising conversion processes in existence today.

The contract awarded to Lummus calls for an evaluation of the *freezing* processes of saline water conversion. (Of the other plants in the series, three will use various distillation processes and one an electrodialysis process.)

The initial activity of Lummus' contract will require preliminary engineering service to prepare estimated plant costs, layouts, and reports. A second phase will include the design of the plant to permit issuance of specifications for the construction of the demonstration plant as well as consultation with the Office of Saline Water on matters relative to awarding a construction contract for the plant.

Lummus was chosen from a group of 35 engineering firms considered for the assignment on the basis of its experience in such parallel fields of technology as refrigeration, heat transfer and crystallization. "Product" from the plant will be water of a quality suitable for municipal, industrial or other beneficial consumption. Production rate will be 250,000 gallons per day.

Over 900 plants have been designed, engineered and constructed by Lummus for the process industry throughout the world in the last fifty years. Why not discuss your next project with a Lummus representative?

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NASA Problems and Chemical Research

By HAROLD F. HIPSHER
Scientist, Advanced Research

IN the National Aeronautics and Space Act of 1958, the NASA was given the responsibility to " . . . plan, direct, and conduct aeronautical and space activities . . . " As defined in the Act, " . . . the term 'aeronautical and space activities' means (A) research into, and the solution of, problems of flight within and outside the earth's atmosphere, (B) the development, construction, testing and operation for research purposes of aeronautical and space vehicles and (C) such other activities as may be required for the exploration of space . . . " In all aspects of this undertaking, chemicals, chemistry, and chemical research play very important roles. Even a partial listing of these aspects is beyond the scope of this article. Therefore, a few of the problems and problem areas will be described briefly. It is probable that these brief descriptions are not sufficient to plan a research program in detail, but they may provide a stimulus for a more thorough exploration of the problems and for new approaches for solving these problems.

To begin with the " . . . problems of flight within . . . the earth's atmosphere . . . ," the NASA is engaged in research on the Mach 3 supersonic transport. The equilibrium temperature of the aerodynamic surfaces at this speed is as high as 600°F and some of the engine components are in the range of 1500-2000°F. Since there are material and structural limitations as well as passenger tolerances to be considered, a method of cooling must be employed. Ordinary air-heat exchangers are ineffective, therefore the fuel must be used as a heat sink for at least part of the heat. It appears that a kerosene that has a boiling range between 300°F and 500°F would meet the volatility and heat sink requirements and be economical enough for commerical transport use. However, most petroleum cuts have traces of impurities that, at the high temperatures, form small amounts of solids that foul heat exchangers, clog nozzles, and cause fuel controls to stick. There is at present no way of predicting the extent of fuel degradation, the degree of degradation the fuel and engine system can tolerate, nor the best method and cost of upgrading fuels to varying degrees. It appears that an extensive research program will be required to answer these questions and to develop a laboratory test method that will adequately correlate full-scale results with laboratory tests.

The flight regime beyond the Mach 3 supersonic transport is being investigated, primarily at the present time, for the return of vehicles or instrument packages from earth orbit or outer space. This research may also find application in sustained hypersonic (above approximately Mach 6) flight within the atmosphere. The vehicles for such flight have many unknowns, especially in the propulsion system, that must be investigated. Among these are cooling, combustion in a supersonic stream, and the degree of reassociation of the combustion gases in the exhaust nozzle. The reassociation problem is common to most of the high performance chemical propulsion systems. As much as a third of the potential propulsive energy can be lost if the dissociated molecules at the combustion chamber conditions do not recombine and release energy during the nozzle expansion process.

The propulsion system for space exploration for the next several years will be the chemical rocket. There are several excellent articles on the status of rockets and propellants (e.g., Chemical Engineering, March 6, 1961 and April 3, 1961). It is sufficient here to state that it does not appear likely that a stable chemical propellant combination can be found with a specific impulse (Isp, pounds of thrust per pound of propellant per second) of over about 500, which is only a few percent greater than the hydrogen-oxygen and hydrogen-fluorine combinations now in a development and advanced research stage.

The use of liquid hydrogen as a propellant has posed several problems because of its low molecular weight, density, boiling point and critical temperature. Since a relatively small weight percent is required for a stoichiometric chemical reaction, small errors in measuring the weight flow cause relatively large errors in delivered thrust and in propellant utilization. This error is complicated by the fact that the density changes rapidly with temperature. While there are adequate volumetric flowmeters available, no adequate mass flowmeter has yet been developed.

Large gains in Isp (above the 500 level) of chemical rocket systems are theoretically possible. This possibility was investigated by a rather extensive research program on free radicals and means for stabilizing them—mainly by trapping the free radicals at very low temperatures. The results of the program were discouraging because of the low concentrations and instability of the radicals. However, the program stimulated basic research on the chemical and physical behavior of a number of atoms

(Continued on Page 6)

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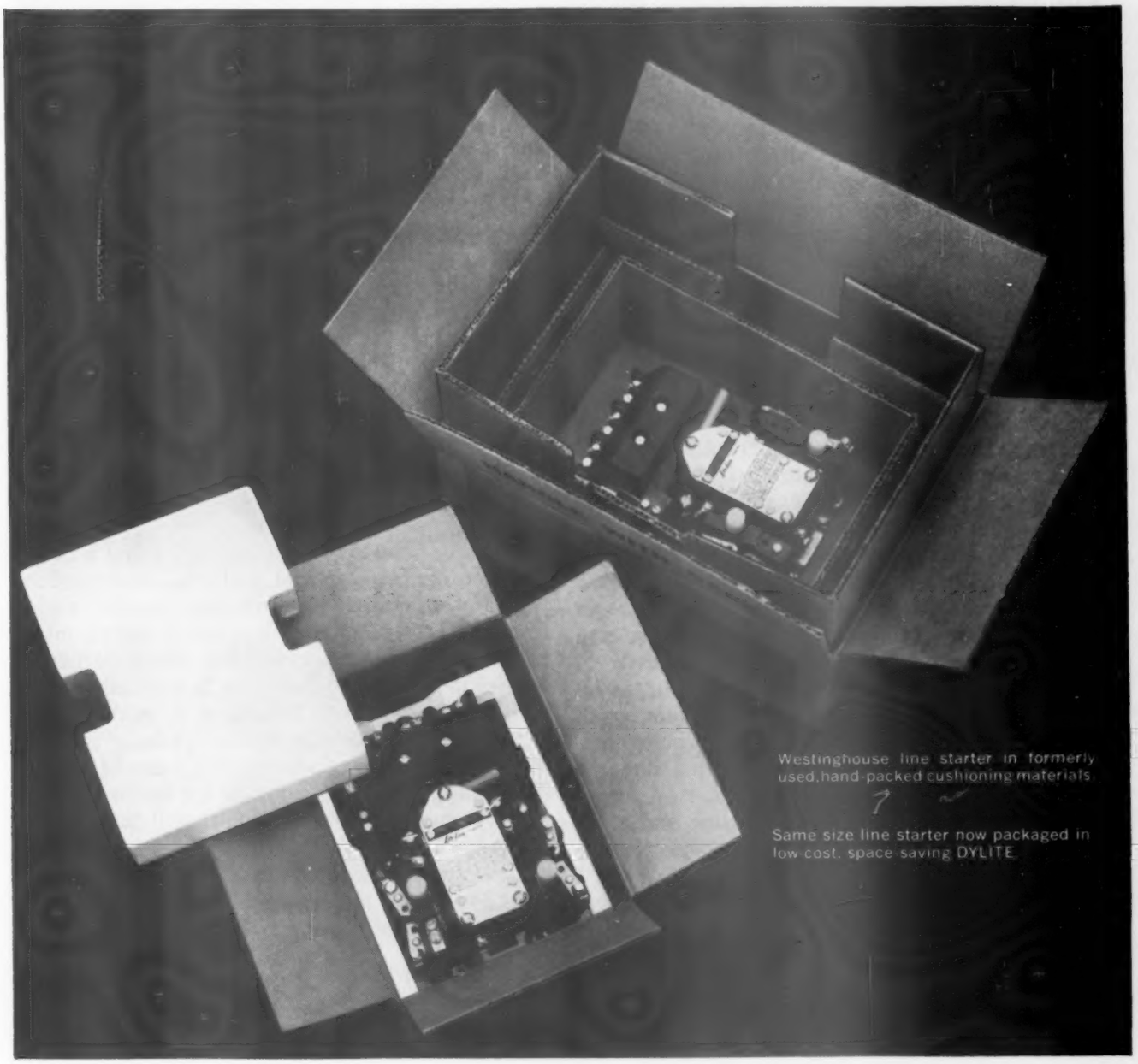
Westinghouse line starter in formerly used, hand-packed cushioning materials
Same size line starter now packaged in low-cost, space-saving DYLITE

NASA— from Page 4

and molecules excited above the stable state. There is no known way of utilizing the large energies involved in this excitation. If the basic research effort does not contribute to finding a high energy propellant, it will provide data to help solve other problems, such as the high temperature dissociation problem mentioned above, and answer other questions, such as the chemical reactions involved in the ionosphere and in the boundary layer of hypervelocity vehicles. Since this is a relatively new field of research, new techniques and a variety of methods are necessary to make significant advances.

The environment and conditions to be encountered in space are, with a few exceptions, almost completely unknown. The thermal radiation from the sun and the almost perfect vacuum are well known, but the number, size, and velocity of meteorites, the high energy particle radiation density, magnetic flux density, effect of zero gravity, etc., are largely unknown quantities. The instrumentation for use in probes and satellites for investigating the upper atmosphere and space environment is quite accurate and light weight. However, new concepts based on different chemical and physical phenomena could furnish data, either not now being obtained or of more value in describing those environments. An accurate description of the space environment can lead to the design and construction of a ground facility for simulating space conditions. While the final test of any system would still have to be made in space, the development time and cost would be drastically reduced by the use of such a facility.

Before attempting a manned expedition to the moon or to a planet, it is quite important to know the structure and composition of its atmosphere and surface. There are three projects scheduled for the next three to 10 years for exploring the surface of the moon. The responsibility of these projects has been assigned to the Jet Propulsion Laboratory of the California Institute of Technology. These projects include a rough landing vehicle (Ranger Project), lunar soft landings (Surveyor Project), and mobile soft landings (Prospector Project).

The scheduled missions proceed from engineering tests of the vehicle and instrumentation with little actual lunar data being collected to quite complicated missions for the collection of a mass of data. The measurement of the physical properties of the moon will include surface texture and hardness; measurements of thermal properties; that is, temperatures, temperature gradients, and thermal conductivity; measurements of density, electrical properties, such as conductivity and permeability; the nature of the moon's magnetic field, if any; a determination of the level of seismic activity; and the use of geophysical methods, such as seismometry and gravimetry, to determine the internal structure of the moon.

The moon's composition will be analyzed both at the surface and subsurface regions, using techniques of both chemical and mineral analysis. Whatever lunar atmosphere exists will be analyzed. Any organic molecules will be isolated and analyzed in the search for pre-life and sub-life forms.

The types of instrumentation required for the collection of these data will include adaptations of instruments currently used in scientific payloads, as well as more ruggedly designed versions of previously Earth-bound laboratory instruments. In some cases, entire new instruments and concepts will be needed. Currently under design study or development are vidicons and other camera systems, surface probes or penetrometers, gamma-ray spectrometers, seismometers, density logging equipment using the gamma-ray technique, thermistors and temperature probes, magnetometers, plasma probes, radiation counters, X-ray fluorescence equipment, X-ray diffraction equipment, fusion systems coupled with mass spectrometers and gas colorimetry systems, mass spectrometers themselves, wet chemical analysis units, and magnetic separators or magnetic susceptibility units.

It is obvious, to those who are familiar with the laboratory equivalents of some of the above instruments, that the task of designing and building such instruments for a lunar landing vehicle, where the weight and space are at a tremendous premium, is a formidable one. The Jet Propulsion Laboratory has encouraged the submission of unsolicited proposals for instruments and concepts for designing instruments. In addition, specifications and requests for bids are issued at intervals to those who request to be placed on the bidders' list.

In conclusion, the NASA is always looking for better, cheaper, or more reliable ways to carry out its responsibilities. In this search for doing a better job; research, development, and small-scale production are supported. The research support varies from the very fundamental physical and chemical research to engineering research for a particular application. Since the need for a particular piece of hardware is rather limited, it is doubtful that very many of the devices will be produced in large quantity. It is always possible that some of the design concepts and even some of the hardware itself may have other applications which will enable them to be produced in quantity, but there is no assurance of any such outcome.

Information on the NASA research grants and contracts program, can be obtained by writing to the Office of Research Grants and Contracts, National Aeronautics and Space Administration.

AIR FORCE SHIFTS HQ STAFF DUTIES; GENERAL SCHRIEVER WEARS FOUR STARS

Lt. Gen. Roscoe C. Wilson Heads Research and Technology

Lt. Gen. Mark E. Bradley, Jr., Heads Systems and Logistics

Lieut. General Roscoe C. Wilson

Lieut. General Mark E. Bradley, Jr.

Brig. General Ralph L. Wassel

GENERAL Bernard A. Schriever has received his fourth star as commander of the Air Force Space Systems Command.

The promotion of General Schriever and the formation of the Air Force Space Systems Command were but one of the steps in the reorganization of the Air Staff at Headquarters.

Another move was to shift procurement and production functions for weapons systems under Lieut. General Mark E. Bradley, Jr., who is Deputy Chief of Staff for Air Force Systems and Logistics. The actual function is under Major General Joseph R. Holzapple, which places the full supply function under a single command.

Lieut. General Roscoe C. Wilson as Deputy Chief of Staff for Research and Technology now has three main functions in his command. Major General William B. Keese directs Development and Planning, Major General Marvin C. Demler directs Advanced Technology, and Brig. General Ralph L. Wassel is Director of Research.

Lt. Col. Darien A. McWhirter, Jr., who is well-known to our membership as Liaison Officer between the Armed Forces Chemical Association and the Air Force is a member of General Wassel's staff.

General Wilson's top military staff includes Brig. General Willis F. Chapman who is Assistant for Foreign Developments, Colonel John R. V. Dickson, Assistant for Research Programming, and Colonel O. P. Thomas, who is the Assistant Deputy Chief of Staff for Atomic Energy.

General Keese has responsibility for development support and development planning studies, and will probably require expenditures of from 35 to 40 millions of dollars.

General Demler's concern for advanced technology will probably center in programs for advanced propulsion, X-15, Pluto, recoverable booster, ballistic missiles, space counter weapons and other programs all undergoing staff review. Expenditures in this phase of the program could total 150 million dollars.

General Wassel has broken his program into applied and basic research. He is concerned with such military problems as: nuclear weapons effects, nuclear applications, aerospace ground equipment, deployable aerodynamic decelerators, navigation

guidance, flight control, weapon fire control, vehicle defense, computer and data processing, advanced weapons, non-rocket propulsion, surveillance techniques, electronic techniques, aerospace medicine, human performance, propulsion, electronics, and systems syntheses. It is expected that this program will require approximately 400 million in expenditures.

General Bradley as Chief Deputy of Staff for Systems and Logistics has a program for (1) operational systems, (2) Command Control and Support, (3) operational support and (4) advanced development. Operational systems include the strategic with the Atlas, Titan, Minuteman, Skybolt, and B-70 weapons. The defense and tactical systems include Bomarc and Midas, GAM-83 and other weapons. Control and support is largely centered in electronic systems while advanced developments will include weapons and instruments for the future. General Bradley is responsible for expenditures expected to amount somewhere near a billion dollars in the fiscal year.

Major General William B. Keese

Major General Marvin C. Demler

RAW MATERIALS FROM AROUND THE WORLD TO CHEMICAL PRODUCTS FOR A BETTER WORLD

For over 65 years The Harshaw Chemical Company has been gathering raw materials from North and South America, Europe, Asia, Africa, and Australia, all the continents of the world.

Until a few years ago, international operations of The Harshaw Chemical Company were confined to the procurement of raw materials and the sale of finished products. Now even the manufacturing and research operations of Harshaw are international. The formation of Harshaw van der Hoorn N.V. of Utrecht, Netherlands is another expansion in international operations. Harshaw's electroplating chemicals, ceramic colors, and catalysts are now being produced in England, France, and Holland, and Harshaw's service is available to customers in the Common Market.

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Combat Troops Get Protective Mask

By SP5 BILL CHURCH

Fort Richardson, Alaska

SOLDIERS in Alaska are the first combat troops in the world to receive the Army's newest item for individual protection against chemical-biological-radiological (CBR) agents, the M17 Protective Mask.

The mask was issued to Alaskan soldiers through the efforts of Major General J. H. Michaelis, U.S. Army, Alaska commander, and will be in the hands of all Army units in Alaska before the year is out.

"Our older model masks, the M9A1, are adequate, but do not have the advanced features of the M17," General Michaelis reported.

"Combat troops in Alaska are faced with the serious problem in winter of maneuvering for long periods in extreme cold," the general added. "Their equipment must be the latest and the best if they are to do their job well. This (USARAL command being first to receive the M17 Protective Mask is another step toward making Army Alaska one of the most modern in the world."

Both the M17 and M9A1 masks use a filter element of mineral fibers and activated charcoal. They protect face, eyes and respiratory tract from field concentrations of vapor or aerosolized chemical-biological-radiological agents.

Both are made of rubber and perform the same duties, but there the similarity ends.

Unlike the older M9A1 mask, the M17 has no outside canister to house the filter elements, offers 30 percent better visibility, 50 percent easier breathing, has lens outserts for winter wear to keep frost from covering eyepieces, and features a voicemitter which enables a soldier to talk and be understood while wearing the mask.

The M17 also uses plastic lenses rather than safety glass, making them harder to damage and cheaper to replace.

"Not only the mask is new," said Lieutenant Colonel Martin L. Denlinger, "a new carrier has been designed that makes it easier to carry, faster to open and easier to take the mask from."

The M15 Field Protective Mask Carrier is made of cotton duck, lined with cotton cloth. It has strips of fiberboard in critical areas to act as stiffeners, offering protection to the mask inside from damage by hard bumps or knocks.

(Continued on Page 10)

Major General J. H. Michaelis, U.S. Army, Alaska commander, talks with Private First Class Adrian Romera (center) and Specialist Four Mike Brennan . . . and understands what they say through their newly issued M17 Protective Masks. The two soldiers are members of Company C, 1st Battle Group, 23rd Infantry.

Sergeant Major Mervin L. Sanders, U.S. Army, Alaska Chemical Office, gives detailed instruction in make-up of the new M17 Protective Mask to men of Company C, 1st Battle Group, 23d Infantry, before they undergo a gas attack demonstration at Fort Richardson's Davis Firing Range.

Wilkin Retires as Hooker Executive

Robert E. Wilkin, senior vice president of Hooker Chemical Corporation, has retired and is moving from New York City with Mrs. Wilkin to establish residence in Washington, D. C.

Wilkin during his 25 years with Hooker Chemical moved up through the sales department to become director of sales and a member of the board. He is also a director of Hooker Chemical Limited, a company with headquarters in Canada.

Mr. Wilkin was originally from Newark, Ohio, and he is an alumnius of Denison University with a master of science degree from the University of Iowa. He is a Denison graduate who has been cited "for his achievements and services". He is a past president of the Buffalo-Niagara Chapter of National Sales Executives, past chairman of the Chicago section of the Society of Automotive Engineers, a member of the Armed Forces Chemical Association, and is a member of Lambda Chi Alpha, Alpha Chi Sigma, and Sigma Xi.

He has been residing at 135 East 54th Street in New York City. He plans to move this fall.

Lummus Constructs Butadiene Plant in India

The Lummus Company has contracted to construct the first styrene-butadiene copolymer rubber manufacturing plant in India. It will be located in Bareilly, Uttar Pradesh, and have a capacity of 20,000 tons per year. The plant is in a sugar cane producing section and will use alcohol to manufacture butadiene. It will be operated by Synthetics and Chemicals Ltd., a company formed by Firestone and Kilachand Devchand and Company Private, Ltd., of Bombay.

Butadiene Rubber Plant in Brazil

The Lummus Company and the Firestone Tire and Rubber Company have been awarded a joint contract to build a polybutadiene rubber manufacturing plant near Recife, in the coastal sugar cane area of the State of Pernambucco, Brazil. The plant will use locally-distilled alcohol produced from sugar cane and have a capacity of 27,500 metric tons per year. James F. Thorton, president of Lummus said his company will provide engineering, and construction services while Firestone will supply the know-how for the polybutadiene process. This plant will promote industrial development in the area, and is sponsored by agencies of the Brazilian Government.

Private First Class Ricardo A. Esquedo (left) demonstrates the M9A1 Protective Mask, which makes parka "bundling" difficult due to its filter canister protruding off the side. Private First Class Robert G. Branscome shows the new M17 Protective Mask, and how the filter pads inside the facepiece enable him to draw his parka hood in close for added warmth.

Masks— Continued from Page 9

"An added improvement," Colonel Danlinger advised, "is in putting pockets on the outside to hold an M1 antidim set and M5A2 protection-treatment set, which were carried inside on the older carrier. These pockets also enable shoulder and waist strap storage when not in use, rather than leave them as we used to."

Most outstanding feature of the mask for Staff Sergeant Jack E. Sullivan, who took part in the gas training exercise at Davis Range, was in getting rid of the canister and putting the larger filters inside the mask's facepiece. "It's so much easier to breath normal, it's almost like not having a mask on," he said.

For Specialist Four Bob J. Matedero, a Company C radio operator, "the voicemitter is the greatest. You can talk in a normal voice and be understood over our field radios, even the walkie-talkie."

The overall opinion of USARL troops issued the new protective mask is, "It's the best yet."

Watkins Accompanies French Antarctic Group

Captain William W. Watkins, Jr., U.S. Army Chemical Corps, recently returned to the continental United States after spending 7 weeks with the 1960-1961 French Resupply Expedition to Antarctica. He was the United States Exchange Observer with the French Expedition and served as the official representative of the United States Antarctic Projects Officer.

Captain Watkins is currently assigned in the Chemical Corps Environmental Field Test Program administered by Dugway Proving Ground, Utah. Previously he had been stationed with the Chemical Corps Polar Environmental Test and Research Team at Camp Century, Greenland.

The U.S. observer jointed the 11th French Expedition in Hobart, Tasmania, Australia, and sailed for Antarctica on the chartered Norwegian vessel NORSEL on December 26, 1960. The ship arrived at the French Antarctica base DUMONT d' URVILLE on January 3, where resupply of the station and a comprehensive five week summer scientific program were carried out. The French are conducting continuation studies in conjunction with the concluded International Geophysical year.

"Weather during the stay at the French Base was the finest ever experienced at this station. The maximum temperature," noted Captain Watkins, "was —2°C and the minimum was —9°C. However, the weather was marred by two periods of high winds when speeds of 80 knots were recorded."

After the base had been resupplied and the summer program completed, the NORSEL departed on the 6 day return voyage, arriving in Hobart on February 10. Remaining behind at the French base was the 18-man winter stay-over team which will be relieved about the same time next year.

Captain Watkins commented that it had been a most enjoyable experience and he hated to leave his many new-found French friends.

Captain William W. Watkins, United States Exchange Observer from Dugsway Proving Ground, Utah, meets a penguin with the French Expedition.

SUPPLY LINE—Members of the French Resupply Exposition to the Antarctic bring supplies ashore to the French Antarctic Base Dumont d'Urville.

ANTARCTIC OUTPOST—French Resupply Expedition camp at Dumont d'Urville in the Antarctic.

PLASTICS IN ARMY ORDNANCE

By MAJOR GENERAL W. K. GHORMLEY
Commanding General
U.S. Army Ordnance Special Weapons-Ammunition Command

Major General William Kerr Ghormley is Commanding General of the U.S. Army Ordnance Special Weapons-Ammunition Command, which was activated on July 1, 1959, to provide, in the words of Lt. Gen. J. H. Hinrichs, Chief of Ordnance, "unified direction of all effort in the Ordnance Corps for conventional ammunition and special weapons."

Installations functioning under the managerial eye of OSWAC have a multitude of vital assignments, including the research and development of warhead components for various type missiles. Perhaps not as spectacular, but certainly as important, is the adaptation of plastics in the Army's ammunition research and engineering program. This mission is carried out at Picatinny Arsenal, near Dover, N. J., one of the Army's pioneers in plastics and the site of the Defense Department's Plastics Technical Evaluation Center.

A 1929 graduate of the U.S. Military Academy at West Point, General Ghormley has held a number of important positions in the U.S. Army Ordnance Corps since 1942. His selection as Commanding General of OSWAC followed a variety of Ordnance assignments, among them service as Military Chief of the Philadelphia Ordnance District, as Commanding General of the Ordnance Weapons Command, and in the Offices of the Chief of Ordnance and the Secretary of Defense.

In this article, General Ghormley tells something of the efforts being made in the field of plastics at Picatinny Arsenal, the research and engineering center of his command.

PLASTICS are gaining prominence in the modern, mobile Army. This is particularly true in new ammunition under development and in production.

At Picatinny Arsenal, the U.S. Army Ordnance Research and Engineering Center for Ammunition and Nuclear Weapons, a research team has been hard at work since the end of World War II when a plastics research organization was established. That team, devoted today to solving existing plastics problems and investigating new, more radical applications, is responsible for the present use of plastics in obturators for artillery ammunition, water tanks, bearings for tank bogie wheels, binders for pyrotechnic compositions and explosives, rocket launchers, missile windshields and fins, and in practice ammunition. It has also incorporated plastics in the design of a number of items now under development, among them a grommet for the protection of artillery shell rotating bands, air frames for missile warheads, lightweight mortar barrels, lightweight shielding for neutron radiation, and others.

Plastic in all shapes and sizes is useful in manufacturing explosive items. Left to right, a plastic anti-personnel mine, a polyethylene nose support for ammunition round and polyethylene spool on which mine trip wire is wound.

Unwanted Plastics

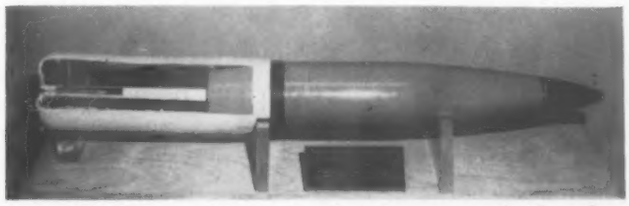
The engineers at Picatinny Arsenal have been able to put generally unwanted attributes of plastics to good use in Army Ordnance designs. As a case in point, the 120mm artillery shell has a plug made of brittle plastics to seal the propellant in the shell casing. After the projectile is placed in the breach of the gun, the casing with the plug top is inserted and rammed forward into firing position. The plastic plug is strong enough to withstand the collision without breaking, yet is fragile enough to disintegrate on firing. This disintegration prevents injury to friendly troops deployed in front of the gun who otherwise might be wounded by plug fragments.

As it is in every phase of Ordnance operations, safety takes priority over all other considerations. An example of how plastic is uniquely used in this regard is seen in one of its applications in a high explosive. A small amount of liquid plastic the size of nickel is placed in a mine fuze between the detonator and the booster. The liquid plastic does not interfere with the detonation of the explosive for the first six months after insertion. After that, however, the plastic solidifies, breaking the fuze

(turn page)

Protective plastic containers insure that explosive items reach their destination in good condition. Artillery fuzes are packed in foam polystyrene, either in "nests" or individually. Polyethylene cups in left foreground are used for shipping ammunition rounds.

Inexpensive plastic is widely used to fabricate devices for training purposes. Plastics technician examines a fuze with transparent case which permits ready internal examination. Simulated block of explosives and practice ammunition round shown are also made of plastic.



A combustible cartridge case that burns completely when fired in a gun contains a combination of plastic and explosives bonded together. The combustible case eliminates the need for expensive brass shell cases and lightens the weight of each shell. In addition, it does away with the litter of spent cartridge cases and the noxious gases released after each firing.

In the interest of weight reduction, Army missile components are fabricated from plastic whenever possible. Shown are missile fin and experimental launching piston, both made of glass reinforced plastic.

Plastics — **Continued from preceding page**

system's continuity and preventing detonation of the mine.

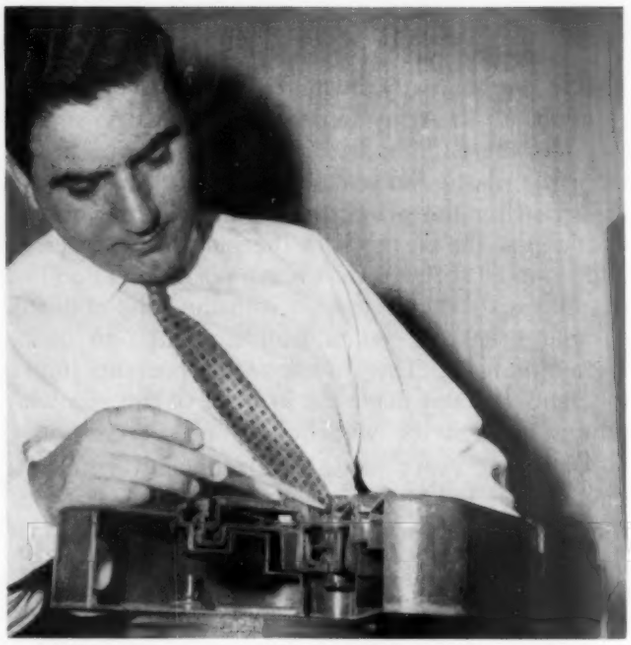
Plastic Igniter

In still another instance, a plastic igniter case is used to prevent both injury to personnel and damage to equipment. Previously used metal propellant igniter cases blew through the rocket nozzle on firing, with metal fragments presenting a hazard to operating personnel and often causing damage to the rocket nozzle. Such hazards—thanks to the fact that the plastic igniter case is consumed in the firing—have been completely eliminated.

Among the principal advantages of plastics in Ordnance are in their more economical use and in their lightness of weight. Plastic components can be produced much more economically than most of their non-plastic counter-parts. Their lightness of weight offers myriad advantages, as is much evident in the missile field, where weight is always a prime factor. As an example, glass-reinforced plastic cases are being fabricated as replacements for the metal rocket motor casings. With the consequent reduction in weight, the missile's flight range remains unaltered even though less fuel is required.

Plastic For Metal

A similar advantage is noted in the use of plastic



A plastic anti-personnel mine, molded from glass-reinforced polystyrene, contains only one metal part—a metal firing pin the size of a small nail, as shown in this cutaway model.

in a battlefield illuminating shell presently under development. The substitution of plastic parts for a number of metal components has effected greater economy in fabrication and will assure the lighter shell the same range with less propellant charge.

Weight reduction achieved through the use of plastics also has resulted in benefit to the foot soldier. Plastics are used in portable rockets, making them easier to handle. A lighter stock and hand grip for an Army rifle using plastics are now under development by Springfield Armory.

Some of plastic's other desirable qualities are used to advantage in a variety of ways. Non-conductive, shock-absorbent, moisture-proof plastic is used to encapsulate delicate tubes and components of electronic guidance or actuating systems. Plastic's non-metallic, non-magnetic characteristics make it extremely difficult to locate with magnetic-type detectors a land mine made of plastic, which also remains virtually impervious to deterioration even after being buried for a long period of time.

Plastic Containers

The art of packaging also has been advanced by the use of plastics. Plastic containers not only are lighter than other types but are water-proof and fungus resistant and act as an additional protective "skin" for delicate instruments.

In brief, lightness of weight is a beneficial factor in any Ordnance item that is hand carried, handled or shot by man.

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Art for the Washington Visitor

By GAIL MERCEY

SEVERAL museums are well worth a visit for those who are interested in the art treasures of the Nation's Capital. Washingtonians have long enjoyed quite fine collections in a number of museums for many years. The city exhibits its works of art in outdoor shows, small galleries and famous museums.

The National Gallery of Art houses the Chester Dale collection which includes works by French artists from the sixteenth through the nineteenth centuries. Here are works by Cezanne, Gauguin, Monet, Degas and Corot. The Mellon collection

"Washington Waterfront" by Gail Mercey.

at the gallery includes artists of the Spanish, Flemish, Rennaissance, English, Dutch, German and American schools. Long loved Rembrandts and El Grecos may be seen as well as paintings by America's Gilbert Stuart and Albert Pinkham Ryder. The museum, too, has changing shows which should not be overlooked.

Galleries

Those who are especially fond of Oriental art must see the Freer Gallery which has one of largest collections of far eastern, near eastern and Indian art in this area. The Phillips Gallery, one of my favorites, includes major works of European and American artists including those of the twentieth century. The atmosphere of the gallery is homelike and inviting with its comfortable furnishings and relaxed feeling. Here you can enjoy the displays in quiet comfort. The recently opened new wing is airy and light and a lovely setting for painting. Rothkos and Mondrians may be seen as well as outstanding Renoirs, Degas and Braques. Dumbarton Oaks Research Library and Collection in Georgetown has an extensive collection of Bysantine art besides being one of the most beautiful garden show places in the city, especially in the spring and autumn seasons.

A visit is indicated, too, to the Corcoran Gallery and the Smithsonian Institution both of which are among the few places that are able to handle large local group exhibits. Both galleries are swamped with entries when a local show is exhibited. The Smithsonian has held many high calibre juried exhibits for local art groups such as the Washington Watercolor Society, the Society of Washington Artists and the American Art League.

The exhibit space in the Smithsonian is scheduled to house a permanent collection of the museum and this has caused a bit of consternation in local art circles which will lose the space for exhibits. The Corcoran Gallery conducts an art school for students of all ages.

At the present time there are probably three times as many smaller galleries in existence in Washington as there were a decade ago, and this estimate doesn't include numerous restaurants, supper clubs and theaters that feature the work of local artists and sculptors. The residents of Washington have shown more interest in owning original works of art than they used to, although the artist still finds this locale a difficult market when compared with some other cities.

Gail Mercey, contributor of the art article, will have a showing of her work at the Burr Galleries in New York in September and a one-man show in Georgetown (Washington, D. C.) in October.

A graduate of Western Maryland College, she has studied with Edmund Archer at the Corcoran School of Art and with Jack Perlmutter and Lothar Brabanski. She taught art a year in junior high school in Prince George's County, Md. and since that time has devoted herself to painting. She has received numerous awards. Recently she was given first prize in water colors at the Rockville Art League for which Mitchell Jamison was judge. Her work has been included in the Washington Watercolor Association's national exhibit which draws work from all parts of the country and she won a special award in this show last year. She has shown at the Smithsonian Institution with Minature Painters, Sculptors and Graver's Society and the American Art League for which she is assistant editor of the organization's bulletin. This spring Miss Mercey worked with Mrs. Roswell Ward and Daniel Millsaps III, in helping organize the Old Market Show in Washington for which there were more than a thousand entries. A regular participant in area shows she has a painting currently in the Southeastern Washington show at Harrigan's Restaurant.

There were some one thousand works including those of Washington and Baltimore artists exhibited this spring in the outdoor exhibit held in the Eastern Market on Capitol Hill. Galleries and Embassies lent their works and supported the show which helped make it a success for everyone. Such unusually large crowds came to the exhibit that it was extended in running time from three days to one week.

For those who enjoy the graphic arts, the Library of Congress often holds outstanding exhibits of work in this media by well-known American and European printmakers, at some exhibits many of the works are for sale. For those who wish to make a purchase, these exhibits are usually of very high calibre and representative of the graphic art world today.

Changing Exhibits

The Corcoran Gallery of Art has many changing exhibits of notable contemporary American and European artists beside their own permanent collection which includes some fine works of the impressionist and the American schools of the nineteenth century.

For those who are able to spend some time, there are numerous small galleries which can be visited. A stroll through Georgetown on the Potomac is exciting and delightful, except on a humid summer day, and the spring and fall are most pleasant seasons to wander through the cobbled streets enjoying the many specialty shops and courtyard gardens of postage stamp size. Numerous galleries can be spotted along Wisconsin Avenue or M Street, the main thoroughfares. Many accessories for the home are on display, too. The Hiratsuki Nippon Gallery on M Street specializes in things Oriental, traditional crafts and woodblock prints for the most part, but also holds occasional shows of local art. The Collectors Gallery on Wisconsin Avenue is worth wandering into to see if one of its frequent exhibits of local or out-of-town talent is on display. Some time during the day stop at the Gallery Coffee House on O Street at Wisconsin Avenue for both art and refreshment in an old New Orleans atmosphere.

In the downtown and midtown area there are various galleries of interest. The Gres Gallery on 20th Street, known for showing the works of artists of Europe and America rather than local artists, is worth a visit as is the I.F.A. Gallery on Connecticut Avenue which shows a variety of artists, local and international, traditional and avant-garde. Here graphics may be purchased by such notables as Miro, Chagall or Picasso or see the works of talented newcomers to the art world.

Contemporary

The Franz Bader Gallery on G Street, representing many of the top Washington and Baltimore artists, is worth a visit to see what is going on as far as styles and trends are concerned in this area, especially for those familiary with the works of the past years. The Potters' House on Columbia Road is an enjoyable place to visit after a movie if for no other reason than to just drop in. It is a unique coffee house in that all the work has been done by people who have volunteered their time and materials to create an oasis of peace and relaxation for those who simply wish to enjoy the art on display, or enjoy reading or conversing in an atmosphere of fellowship. This was the aim of the religious group that organized the Potters' House, and I believe that they have been successful.

These highlights of art on the Washington scene may reveal some of the many opportunities for gallery-goers. The list which follows includes most all of the galleries, large and small, in the area. The newspapers describe the exhibits and the hours in more detail. For those who desire some specific information, a telephone call to the gallery should suffice.

In Washington, D. C.:

American Institute of Architects, 1741 N.Y. Ave., N.W.
Artists Mart, 1361 Wis. Ave., N.W.
The Arts Club, 2017 Eye St., N.W.
Barnett Aden Gallery, 127 Randolph Pl., N.W.
Capitol Hill Gallery, 20 E St.
Collectors Gallery, 1625 Wis. Ave., N.W.
Corcoran Gallery, 17th and N.Y. Ave., N.W.
Dickson Gallery, 3237 P St., N.W.
Dupont Theater Gallery, 1332 Conn. Ave., N.W.
Fantasy Gallery, 1365 Conn. Ave., N.W.
Franz Bader Gallery, 1705 G St., N.W.
Freer Gallery, 12th and Jefferson Dr., S.W.
Galerie Internationale, 2101 S St., N.W.
Galerie Realite, 1252 Wis. Ave., N.W.
Gallery Coffee House, 3213 O St., N.W.
George Washington Univ. Library, 2023 G St., N.W.
Gres Gallery, 1729 20th St., N.W.
Hiratsuki Nippon Gallery, 3116 M St., N.W.
Howard Univ. Gallery, on the campus
I.F.A. Gallery, 2623 Conn. Ave., N.W.
Jefferson Place Gallery, 1216 Conn. Ave., N.W.
Library of Congress, 1st St. and Independence Ave., S.E.
National Gallery, 6th St. and Constitution Ave., N. W.
Obelisk Gallery, 3241 P St., N.W.
Pan American Union, 17th St. and Constitution Ave., N.W.
Phillips Gallery, 1600 21st St., N.W.
Potter's House, 1658 Columbia Rd., N.W.
Smithsonian Institution, 10th St. and Constitution Ave., N.W.
Watkins Gallery, American Univ. campus
Wigder Gallery, 1722 21st St., N.W.
West End Gallery, 1914 I St., N.W.

In Maryland and Virginia:

Henri Gallery, 113 S. Royal St., Alexandria, Vr.
Studio Gallery, 814 Prince St., Alexandria, Va.
Tilburne Art Gallery, 301 N. Washington St., Alexandria, Va.
Rockville Civic Center, Edmondston Rd., Rockville, Md.
The Art Shop, 8209 Georgia Ave., Silver Spring, Md.

Once Over Lightly on Where to Dine

By JOHN P. McGILL

THE Federal City has many fine restaurants featuring menus to suit everyone's taste whether the visitor comes from Boston or Bhagdad.

Since the 16th Annual Meeting is in the Statler-Hilton Hotel, let's start there with Trader Vic's. It is the newest restaurant in Washington and is host to capacity crowds so phone downstairs for a reservation. The food and drinks are supposed to remind the customer that he or she is in the Islands of the South Seas, Polynesian, for instance, or dining on Oriental fare so go ahead and fool yourself you won't regret it.

Across the street is the Falstaff Room in the Sheraton-Carlton Hotel. It is a dark, below-ground beef-eaters haunt which serves special prime ribs that would do justice to Henry VIII. If you are a sald buff, or your lady likes a special salad, phone Paul for reservations and tell him you are coming so he can make a Caesar Salad for you.

Within walking distance on Connecticut Avenue, 1107 to be exact, is Harvey's which was founded in 1858 and puts forth really solid fare. If you haven't tasted them before, try hickory smoked shrimp served in the shells for an appetizer. Mix a little mayonnaise with the shrimp sauce, order a stein of Harvey's own musty ale, and if it is lunch time, you'll want to spend the day there. Harvey's has been serving shrimp to movie moguls, anxious athletes, and particular friends of politicians who have visited here during the years. It is a favorite spot for J. Edgar Hoover, top FBI man.

Midtown

Paul Young's is at 1120 Connecticut Avenue, and it is a restaurant that serves food with a flourish. It was decorated by the famed William Pahlmann, who did the Four Seasons in New York City. The waiters are skilled in excellent table service and make final preparations for many dishes right at you table.

Fan and Bill's is in the same block on Connecticut, and for years has specialized in planked steaks and sea foods. At lunchtime the chopped chicken livers with tomatoes on the side, garnished with big rings of Bermuda onions is a fine dish. A brace of martinis with the chopped liver and you've had lunch unless you are a dessert type, and I've always been able to eat the frozen eclair.

La Salle Du Bois at 18th and M Streets is one of the top rated Washington restaurants. The food and service are French in the manner of the Tour d'Argent in Paris or the Pavillon of Chambord in New York. Everything is first class, including the prices.

The Colony Restaurant at 1737 DeSales Street, a street on the north side of the Mayflower Hotel, is also considered a fine restaurant with the best of service.

Georgetown

Georgetown is but a taxi ride from the hotel and the residents of Washington never tire of a walk or ride through this area of the city. It has the colonial atmosphere, sometimes authentic, of the early days in the colonies. It was the seaport for the Washington area and the interchange for the barge canal that George Washington started along the Potomac River. This barge canal was intended to be a freight entry into the lands of Ohio Territory, and it did aid cargo movement as far north and west as the Cumberland Water Gap.

My favorite Georgetown stop is Frances at 1204 30th Street where there is a charming terrace and outdoor bar as well as dining rooms inside. The menu is varied but there is a specialty each day of the week, and you can't go wrong with it.

The Rive Gauche at Wisconsin Avenue and M Street has achieved fame for its excellent French cuisine. Prices are moderately expensive.

Billy Martin's Carriage House, now with the third generation of owners, is at 1238 Wisconsin Avenue. Billy believes in serving the best of drinks, and the menu is American like apple pie. He also has a Tavern up the street on the corner. It is dark and cool and the draft beer is excellent. He ran the Tavern before the resurgence in Georgetown demanded a place like the Carriage House.

The Town House Restaurant at 1356 Wisconsin Avenue is typical of Georgetown and has a varied menu. I recommend the creamed chicken wrapped in crepes, as one of the things they do well.

Spanish

For Spanish or Mexican dishes go, by all means, to La Fonda at 1639 R Street. They are open for dinner after five p.m., and if you are novice with Mexican food order the 'La Frontera,' a dinner with a little bit of everything you should try. If you know Spanish foods here is the opportunity to show your knowledge. Prices are moderate.

The Genghis Khan at 1805 Connecticut Avenue specializes in the foods of Asia. The restaurant features specialties from China, Japan, Korea, In-

donesia, Siam and other countries. There are hot appetizers to nibble with cocktails, and if you care to make known your wants 24 hours in advance you can have shar fin soup or other delicacies.

An out of the way place that is quiet, moderately expensive and very different is Twining Court Stables in the rear of 2120 P Street. It is an old coach house where the drinks are right and atmosphere and food are satisfying.

There are other restaurants as Blackie's House of Beef, L'Espionage, The Good Earth, The Occidental, Mayflower Dining Room and many others. I have tried to give you a feel for restaurants, some out of the ordinary, that will give you the impression that the City of Washington sets a good table for the guest in our town.

The writer has experienced all of the places recommended. The restaurant management had no knowledge that an article was to be written. I paid my own check, (ouch). But this is the best way to do it. Good appetite and happy dining.

Heyden Newport Produces Fumaric Acid

The new fumaric acid plant of Heyden Chemical Division is on-stream with an 8-million pound capacity at Garfield, New Jersey. Fumaric acid is a building block in the manufacture of synthetic resins, paints, varnishes, and is used in lube oil additives, fiber reinforced laminates, molded plastics and agricultural chemicals. It is used in food processing industries as an acidulent and can be combined with other chemicals in ice to help fight fungicides in fresh vegetables and fish, and to stabilize edible fats and oils against rancidity.

Swiss and Swedes to Use British Weapon

Both the Swiss and Swedish Governments have placed orders in the multimillion dollar class for the Bloodhound Mark 2, a surface-to-air guided weapon system for air defense, the British Aircraft Corporation has announced.

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Board of Directors Elects Askin; Changes Made in Constitution

PRE-MEETING CLOSEUPS

Simon Askin, Gen. Charles E. Loucks, Dr. Wendell Jackson

Dr. William J. Taylor, Jr., William G. Kinsinger, Dr. Frederick Bellinger.

Dr. Frederick Bellinger and Victor Searle

Robert T. Norman and Robert J. Milano

Simon Askin was elected president of the Armed Forces Chemical Association by the Board of Directors at their annual meeting held in the Army-Navy Club, Washington, D. C.

At the same time, Major General Marshall Stubbs, Chief Chemical Officer of the Army, was renamed honorary president.

Eight vice-presidents also took office, and Charles E. Pledger, Jr. was appointed general counsel with Ovid E. Roberts, Jr. filling the post of secretary-treasurer.

Terms of the president and vice presidents are for two years.

Mr. Askin was unanimously elected and ran without opposition.

It was the first meeting of a newly elected Board of Directors which convened for the purpose of electing officers, and formally adopting the new constitution for the Association.

Studies and proposals for changes in the policies of the Armed Forces Chemical Association had been under way for more than a year. These actions resulted in a new constitution which was voted upon and adopted by the membership.

Seven of the eight vice presidents were assigned specific duties and titles under which each one will function in the newly constituted organization. The exception was W. Ward Jackson, who with the title of vice president, will work closely with the president rather than on special assignments.

The other vice presidents are: Gen. Charles E. Loucks, War Mobilization; Robert J. Milano, Chapters; Col. Victor C. Searle, Civil Defense Planning; G. N. Glidden, Public Relations; Donald MacArthur, Meetings; and Admiral M. P. Hottel, Technical Committees.

The Armed Forces Chemical Association is now prepared to offer aid to any agency of the federal government —if requested to do so—on chemical problems in research, production, training, technical questions, or anything that can be done by industry.

There is no change in the basic purpose of the Armed Forces Chemical Association. It still remains a patriotic, non-profit, non-political group of U.S. citizens dedicated to the national defense.

The change, however, in some of its purposes was bound to come. These changes were brought about by the advances in the chemical field, and the

wider application of chemicals to national defense.

In its early beginnings, the Armed Forces Chemical Association was similar, in many ways, to veteran's group. Most of the members had been in either military or government service during World War II, and many if not a high percentage had been in service or allied with the Army Chemical Corps.

The Association's efforts were directed towards defense against chemical, radiological and biological weapons. But since those days, the needs and uses of chemicals are far broader than any one type of weapon, no matter how lethal or dangerous its potential.

For example, atomic energy or the fissionable material for it is chemically made, there are demands for rocket fuels, plastics, man made fibers, drugs foods, fuels and new metals and material plus the unknown requirements that space exploration will place on chemical knowledge.

Many of the products in everyday use by both military and civilians were unheard of for practical purposes at the time the Armed Forces Chemical Association was formed.

Now members of the Association are the general contractors for the bulk of the AEC output. They provide drugs and medicines, food processing and machinery, rocket fuels, plastics, fibers, petroleum products and almost anything you would care to mention.

It was natural, then, that these members who were working with chemicals and chemical problems would eventually center their activities in a single group effort.

The Association can now in good conscience tackle any chemical problem from a short water supply to public health, or from plastic space ship parts to underwater blasting charges. It will offer as such knowledge as its members can command to the Navy and Air Force as well as the Army, and will also do the same for other federal agencies.

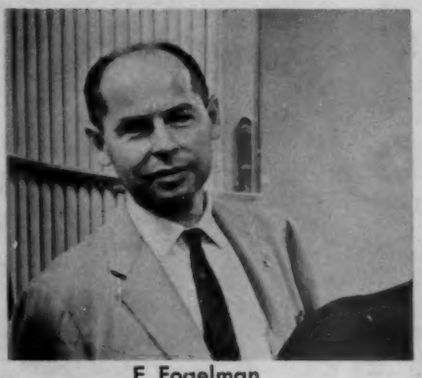
It was agreed at the Board of Director's Meeting to fill a newly created post of Executive Director of the Association. Edgar L. Newhouse III who has joined the Association in that capacity is devoting full time to this work.

The Association offices in Washington have been moved to more spacious quarters at 1025 Connecticut Avenue, and members are invited to drop in and use desk space, or receive calls there when in the Capital.

W. Ward Jackson confers with Robert Milano, Louis Munchmeyer and others.

Dr. Woodrow W. Wedum, W. T. Cofer Jr., Dr. Per K. Frolich.

Douglas E. Wilson and Lt. Col. Clyde H. Westbrook, Jr., (l to r foreground) Harry A. Kuhn and Simon Askin (l to r background).



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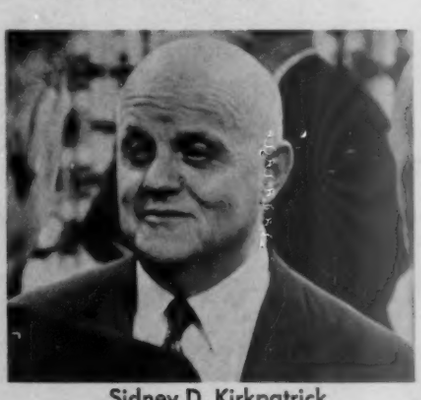


Sidney D. Kirkpatrick

Brig. Gen. Graydon C. Essman, Louis W. Munchmeyer and Dr.. Per K. Frolich

Dr. Wendell F. Jackson and Gen. Charles E. Loucks

Adm. M. P. Hottel, Gen. Charles E. Loucks, Dr. Wendell F. Jackson

EXECUTIVE COMMITTEE NAMES NEWHOUSE EXECUTIVE DIRECTOR

Edgar L. Newhouse III was appointed Executive Director of the Armed Forces Chemical Association by the Executive Committee acting for the Board of Directors. The appointment was effective 1 August.

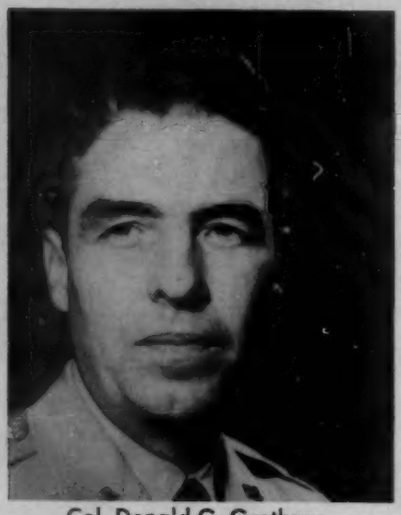
It is the first time the Armed Forces Chemical Association has had an executive director. Previously, the executive functions of the organization were accomplished on a volunteer or assignment basis by various members, many of them corporate executives or ranking military figures, who received guidance from the Association president or its executive committee, all of these men were also doing full-time work elsewhere.

Mr. Newhouse, who resides in Chevy Chase, Maryland, is a family man with a wife and five children. He had been employed by the American Smelting and Refining Company, except for the WW-II years, since his graduation from Princeton University.

He began with the company in their sales division and rose to general sales manager before he came to the Capital as Washington representative for American Smelting. He attended Choate School and, in addition to his AB at Princeton, he also studied at Princeton School of Public and International Affairs.

Newhouse enlisted in the Navy during WW-II and graduated from Officers' Training School as an Ensign in 1941. He served in the Operations Office of the Third Naval District for two and one-half years, and was then project officer in the Bureau of Ships for another two and one-half years, working on the development of an underwater sound locating and ranging system. His headquarters for this project was in the Bahama Islands. Newhouse was a Lieut. Commander at the time of his release from active duty.

WITH THE CHEMICAL CORPS



Col. Donald G. Grothaus

COLONEL GROTHAUS NAMED DEPUTY CHIEF CHEMICAL OFFICER

Colonel Donald G. Grothaus has been appointed Deputy Chief Chemical Officer, Army Chemical Corps, the Department of the Army has announced.

Prior to his appointment, he was Assistant Director of Procurement, Office of the Deputy Chief of Staff for Logistics, Army.

Colonel Grothaus, born at Lake City, Minnesota in 1912, has spent more than 25 years in the military service throughout the world. He received his early schooling in the Iowa public schools and attended the University of Iowa from 1929 to 1931. He graduated from the United States Military Academy in 1936.

He was commissioned Second Lieutenant, Artillery, upon graduation from the United States Military Academy, and later transferred to the Army Chemical Corps. Some of Colonel Grothaus' major assignments have included that of Chemical Officer and later Deputy Chief of Staff, 7th Air Force (June 1944-Dec. 1945); Assistant Commandant, Chemical Corps School; Deputy Commanding Officer, Army Chemical Center, Edgewood, Maryland; Commanding Officer, Rocky Mountain Arsenal, Denver, Colorado; and Post Commander and Commanding Officer, U. S. Army Biological Laboratories, Fort Detrick, Maryland.

Colonel Grothaus has attended the Command and General Staff College and has a Masters Degree from Stanford University, Palo Alto, California. He also is a graduate of the Industrial College of the Armed Forces and has completed the Advanced Management Program at Harvard University.

In his new assignment Colonel Grothaus replaces Colonel Adam W. Meetze who will be Director of Military Operations, Chemical Corps. Colonel Lloyd E. Fellenz, now in the post, is being reassigned to command the U. S. Army Chemical Center and Chemical Corps Materiel Command, Edgewood, Maryland.

He and Mrs. Grothaus and their daughter Margaret Jane, and son John, 17, reside at 406 Neal Drive, Alexandria, Virginia.

Sergeant First Class William R. Leek (left), Chief of the Administration Section, Control Branch, Office of the Ordnance/Chemical Officer, U.S. Army Japan, receives the Army's Suggestion Award Certificate from Lieutenant Colonel Calvin B. Banigan.

Six Japanse employees received letters of commendations from Governor Iwataro Uchiyama of Kangawa Prefecture for faithful service to the Japanese government as employees of U.S. Army Forces in Japan. They are with Major William B. Strough, Deputy for Chemical Operations. From left to right: Mr. Shojiro Inoue, Mr. Yoshizo Sugimoto; Miss Kiyoe Noguchi; Major Strough; Mr. Takenosuke Waragaya; Miss Mieko Sakai; and Mr. Akira Taguchi.

MILITARY ASSIGNMENTS

July, 1961

Colonels

C. W. Bartling ..... Ft. McClellan, Ala.
R. W. Breaks ..... USAREUR
J. R. Chapman ..... Ft. Bragg, N.C.
W. F. Lynch ..... Dept. H.E.W.
M. A. Middlebrooks ..... Ft. McClellan, Ala.
E. V. R. Needles ..... Ft. Monroe, Va.
L. A. Parks ..... Ft. McClellan, Ala.
J. C. Prentice ..... Pres. S. Fran., Calif.
A. O. Kiken ..... Ft. McNair, D. C.

Lt. Colonels

R. E. Branson ..... Ft. Monroe, Va.
E. Dalton ..... AFSC, Va.
O. C. Davis ..... Ft. Monroe, Va.
V. E. Dehner ..... Ft. McClellan, Ala.
C. Dombrowski ..... Ft. McClellan, Ala.
J. J. Fraser ..... Ft. Bragg, N. C.
T. J. Hallinan ..... D. C. SLOG, D. C.
W. T. Hunt ..... Ft. McClellan, Ala.
T. R. Isaacs ..... USAREUR
D. D. McCorrey ..... Dugway, Utah
B. G. Moore ..... USAREUR
W. T. Moseley ..... OCCMLO, D. C.
H. C. Schade ..... Ft. Belvoir, Va.
A. L. Smith, Sr. ..... Army Cml. Ctr., Md.
K. J. Wilson ..... Korea

Majors

J. Aaron ..... USAREUR
E. B. Broome ..... Army Cml. Ctr., Md.
B. G. Elfert ..... Army Cml. Ctr., Md.
R. B. Elliott ..... Cml. R&D, D. C.
H. E. Hude ..... USARAL
L. M. Kellam ..... Ft. McClellan, Ala.
L. A. Koch ..... USAREUR
M. J. McCague ..... Ft. Lee, Va.
J. Montgomery ..... Pine Bluff Arsenal, Ark.
D. P. Norton ..... Dugway, Utah
E. J. Odachowski ..... Ft. Bliss, Texas
H. P. Ohm ..... USAREUR
A. R. Rausch ..... Pine Bluff Arsenal, Ark.
F. M. Robertson ..... Dugway, Utah
R. S. Turner ..... Ft. Ord, Calif.
A. E. Vernon, Jr. ..... Texas A. & M. College
J. W. Walker ..... DCSPER, D. C.
J. J. Zidar ..... Maxwell AFB, Ala.
T. T. Zerick ..... Cml. R&D, D. C.

Captains

S. H. Bass, Jr. ..... OCCMLO, D. C.
B. R. Blankenship ..... Ft. McClellan, Ala.
G. F. Byrnes ..... Panama
G. F. Carroll ..... C. & GS, Kansas
W. E. Dismore, Jr. ..... UCLA, Calif.
R. V. Garcia ..... Ft. McClellan, Ala.
G. A. Germuga ..... Syracuse Univ.
T. M. Goodsite ..... Army Cml. Ctr., Md.
D. W. Greene ..... USAREUR
R. E. Guyton ..... Pine Bluff Arsenal, Ark.
T. H. Holcomb ..... USAREUR
A. Johnson, Jr. ..... Ft. McClellan, Ala.
J. Johnson, Jr. ..... USARAL
W. E. King ..... Ft. Benning, Ga.
H. D. Mathaney ..... USARAL
E. Mullett, Jr. ..... Korea
C. W. Petterson ..... TDY Omaha Univ.
J. R. Pirkl ..... USAREUR
C. L. Pittman, Jr. ..... Okinawa
B. F. Powel, Jr. ..... Korea
C. L. Predmore ..... USAREUR
F. M. Sargent ..... Ft. Ord, Calif.
J. E. Starkey ..... Army Cml. Ctr., Md.
F. J. Thomas ..... Ft. MacArthur, Calif.
J. M. Turner, Jr. ..... OCCMLO, D. C.

Lieutenants

J. R. Fleming ..... Ft. McClellan, Ala.
M. K. Glora ..... Mercury, Nev.
J. R. Law ..... USAREUR
N. Maravic ..... Army Lang. Sch., Calif.
G. A. Miller ..... Aun. Sch., Ala.
W. J. Weeks, Jr. ..... Ft. Lewis, Wash.
A. T. Zukowski ..... Dugway, Utah

New Assignment—August

Colonels

J. H. Batte ..... Cml C Engr. Comd., Md.
J. J. Hayes ..... Cml. C R&D, D. C.
R. K. Nelson ..... Natl. War College
D. L. Vincent ..... Indus. Col. of AF, D. C.

Lt. Colonels

J. G. Appel ..... Army War College
R. H. Berger ..... Korea
M. W. Briggs ..... Cml C Board, Md.
G. W. Connell, Jr. ..... DCSOPS, D. C.
C. W. Cook ..... Army Rsch. O, D. C.
C. O. Duty ..... ADCS LOG, D. C.
J. Gay ..... AFSC, Va.
J. D. Servis ..... Army War College
W. W. Stone, Jr. ..... OPN Rsch. Gp., Mc.

Majors

J. P. Berg, Jr. ..... Cml C R&D, D. C.
D. P. Arnold ..... USAREUR
R. E. Bell ..... Ft. McPherson, Ga.
E. H. Bishop ..... DCSLOG-LG, Chicago
D. D. Bluejacket ..... Pine Bluff Arsenal, Ark.
D. H. Bronson ..... Panama
W. T. Burnham ..... USAREUR
T. W. Connolly ..... Korea
W. J. Cribb, Jr. ..... Turkey
F. H. Gudridge ..... OPN Rsch. GP, Md.
R. A. Hiscox ..... Army Cml. Ctr., Md.
G. C. Jacobsen ..... Ft. Eustis, Va.
G. A. Lynn ..... C & GSC, Kans.
M. M. Mryczko ..... Naval War College
J. J. Osick ..... C&GSC, Kans.
J. Bowings ..... Korea
B. R. Shields, Jr. ..... Dugway, Utah

Captains

W. C. Allen ..... Student, Cml. C School
J. J. Ball ..... C&GSC, Kans.
R. C. Banks ..... C&GSC, Kans.
H. J. Brady ..... Student, Cml. C School
J. A. Bryan ..... C&GSC, Kans.
D. B. Cary ..... Army Cml. Ctr., Md.
L. L. Cummins ..... Ft. Sill, Okla.
R. A. Drewyor ..... Student, Cml. C School
H. A. Hardin ..... Korea
H. H. Harper ..... Student, Cml. C School
S. W. Hodges ..... Student, Cml. C School

Goodrich Forms Government Division

J. W. Keener, president of B. F. Goodrich, has consolidated the sales responsibilities of the company to the federal government in a single Aerospace and Defense Products Division. C. B. McKeown has been appointed general manager. The company's direct and indirect sales to the federal government last year amounted to more than 55 million dollars, or 7.3 per cent of Goodrich total net sales. Goodrich has supplied tubeless tires for aircraft, pressure sealing zippers for aircraft and space suits, electric and pneumatic de-icers, solid rocket propellants, ablative structures, missile components, rocket cases and tires and brakes for military vehicles.

Dow to Produce Polystyrene in Greece

Dow Hellenic Chemical Industry Lts., will be the first producer of polystyrene in Greece. Ground breaking ceremonies for the plant at Lavrion were marked by the attendance of religious and civic officials in the community as well as Greek Minister of Industry.

Celanese Moves Offices to Fifth Avenue

Celanese Corporation of America has moved its executive offices and headquarters into eight floors of a new building at 522 Fifth Avenue at 44th Street, New York City. The company had been in its previous location at 180 Madison Avenue since 1929, but had expanded out of those quarters and overflowed into an adjoining building at 16 East 34th Street. The move puts the company offices back under one roof. Celanese has 19 plants and research laboratories in the United States, affiliates in Canada, Mexico, Colombia, Venezuela, Brazil and Japan. Its products are exported to more than 60 different countries.

Allied Chemical to Build Plant in Virginia

Allied Chemical Corporation is building a plant at Hopewell, Virginia to produce nitrogen tetroxide, a rocket fuel oxidizer. The plant will double capacity for Allied's output and the oxidizer will be used in the Titan II.

A. H. Light, Jr. ..... Ft. Rucker, Ala.
J. M. Longstreet ..... C &GSC, Kans.
R. E. Lund ..... Student, Cml. C School
J. A. McDade ..... C&GSC, Kans.
W. C. Miles ..... USARHAW
J. L. Papin ..... Korea
D. M. Pederson ..... C&GSC, Kans.
L. W. Pettit ..... Student, Cml. C School
F. D. Posey ..... Student, Cml. C School
J. T. Pooler ..... Pres., S. Fran., Calif.
W. G. Powell ..... Nucl. Def. Lab., Md.
R. H. Ratcliff ..... Student, Cml. C School
W. D. Robertson ..... Cml. C Engr. Comd., Md.
C. A. Sands ..... Ft. McClellan, Ala.
G. D. Shingleton ..... Okinawa
E. W. Standish ..... Korea
E. J. Steckler ..... Rocky Mountain Arsenal, Colo.
L. T. Winegar ..... Army Cml. Ctr., Md.
D. D. Wingfield ..... Student, Cml. C School
A. L. Wrang ..... Army Cml. Ctr., Md.

Lieutenants

G. J. Alton ..... Student, Cml. C School
J. W. Armistead ..... Student, Cml. C School
A. A. Barry ..... Student, Cml. C School
D. E. Bivings ..... Student, Cml. C School
P. Bizic, Jr. ..... Student, Cml. C School
G. L. Bower ..... Student, Cml. C School
M. D. Brailsford ..... Student, Cml. C School
J. E. Brown ..... Student, Cml. C School
E. C. Culbreth ..... Student, Cml. C School
C. W. Cyr, Jr. ..... Student, Cml. C School
J. V. Di Giaminto ..... Student, Cml. C School
R. P. Gall ..... Student, Cml. C School
J. F. Holmes ..... Student, Cml. C School
W. M. Hooker ..... Ohio State University
J. W. Kelley, Jr. ..... Student, Cml. C School
K. H. Malone ..... Student, Cml. C School
C. L. McDermott ..... Student, Cml. C School
W. A. Moore ..... Student, Cml. C School
W. E. Mountel ..... Student, Cml. C School
J. S. Mudgett ..... Student, Cml. C School
J. E. Roberts ..... Student, Cml. C School
B. C. Robinson ..... Student, Cml. C School
R. G. Rudrow, Jr. ..... Student, Cml. C School
L. W. Skinkle ..... Ft. Bragg, N. C.
J. Smargon ..... Student, Cml. C School
J. W. Stahlman ..... Student, Cml. C School
J. D. Saunders ..... Student, Cml. C School
K. R. Simila ..... Student, Cml. C School
J. R. Tedeschi ..... Iowa State Univ.
D. S. Tribe ..... Student, Cml. C School
G. G. Watson ..... Student, Cml. C School
E. C. Weckel ..... Student, Cml. C School
D. L. Neuville ..... Student, Cml. C School
D. A. Nydam ..... Student, Cml. C School
T. J. Mawhorter ..... USAREUR
R. C. Pietsch ..... Student, Cml. C School
K. E. Robinson ..... Student, Cml. C School

Retirements—July

Col. V. C. Searle ..... Washington, D. C.
Lt. Col. F. W. Jones ..... Ft. McClellan, Ala.
Lt. Col. F. E. Rosell, Jr. ..... Ft. McClellan, Ala.
Major D. H. Saunderson ..... Ft. Detrick, Md.
C.W.O. A. L. Kelley ..... Yuma, Ariz.
C.W.O. R. H. Necel ..... Army Cml. Ctr., Md.

Relieved from Active Duty
July

Lt. J. F. Fallon ..... Army Cml. Ctr., Md.
Lt. J. J. Frattini ..... Ft. McClellan, Ala.
Lt. J. P. Hendrickson ..... Ft. McClellan, Ala.
Lt. D. H. Krause ..... Ft. Ord, Calif.

August

Capt. W .G. Horbert ..... Ft. Bragg, N. C.
Lt. R. Thompson ..... Ft. McClellan, Ala.

Ice Crystals in Final Brewing Stage Mark New Process in Beer-Making

No Change in the Customers' Beer; Process Attacks Costs of Storage and Shipping

Water and Impurity Removal Provides Beer Ready for Immediate Carbonization

Federal Alcohol and Tobacco Tax Unit to Hold Hearings This Fall on Labelling

THERE is a new way to make beer.

Various names have been used to describe the process such as dehydration, frozen, concentrated and instant, a favorite with some newspaper writers.

As far as the customer is concerned the beer will be as fresh as ever and be delivered in the same type packaging through the same type retail outlets. The customer likes it this way and is keeping beer production at the present levels of between 85 million and 89 million barrels per year.

Each beer barrel is measured at 31 gallons capacity, and for estimating only, beer retails at from one dollar and a quarter per gallon upwards in price. Beer customers in the aggregate are parting with an estimated 3.5 billion dollars yearly for the golden liquid topped with suds.

Water Extracted

Union Carbide Development Company which has developed this process in the final stages of brewing beer calls it a beer concentration process. The chemical principle involved is the freezing of ice crystals which permits water extraction from the beer liquid without loss of flavoring constituents.

To find out what this might mean in the brewing industry, all beer drinkers will have to back up one step from the beer as he or she knows it to be the beer as it is in the last stage of brewing at the brewery.

Beer in its final stages is known as Ruh beer and, traditionally, it is held in storage tanks for weeks after fermentation to lager. The lagering process is the period of time when trouble making materials are removed and the beer can be filtered before it is recharged with carbon dioxide for packaging and delivery into the trade.

The Union Carbide process can begin immediately at the end of fermentation by piping the Ruh beer into an ice generator where pure ice crystals are grown. The partly concentrated beer and ice crystals are separated in a first stage centrifuge, and the process is repeated and completed in a second centrifuge at which time the beer has reached final concentration. The concentrate leaving the second centrifuge is filtered and ready for reconstitution—by addition of water and carbon dioxide—or storage.

This concentrated beer is one-quarter the volume of the drinking beer as it goes to the customer. The concentrated beer may be stored at normal room temperatures, and tests, so Union Carbide reported, have shown remarkable stability for this beer under adverse conditions.

To date, the brewing industry, the federal government, the labor unions, and the freight handlers have all shown various interests in the new process for concentrating beer.

Cuts Costs

As far as the brewing industry is concerned, the concentrate cuts transportation costs drastically, it could produce a change in the marketing methods for beer, it could eliminate the costs of producing and storing large quantities of beer for peak demand and spread the brewing cycle over a larger operating period.

Members of the brewing industry have different views on the benefits to be derived by individual brewers. Basically, fears and hopes are based on possible changes in the marketing pattern for beer. Some of the smaller brewers who concentrate their efforts in local markets are worried that the reduced transportation costs may wipe out some of the freight advantage they now enjoy.

Large volume breweries could ship their concentrate into outlets for reconstitution in retail territories at less investment and expense than would be needed to build entire breweries for various local markets. The large companies, too, would theoretically develop stronger advertising and merchandising appeals.

The federal government is already in the beer business to the extent of nine dollars taxes per 31-gallon barrel of beer. If for no other reason than taxes—and there are other reasons—Uncle Sam is very much interested in beer. For example, if the taxes were nine dollars per barrel on the concentrated beer instead of the drinking beer then the federal government would lose three-quarters of its revenue from beer taxes. At the going rate, the federal government is collecting around three- quarters of a billion dollars from beer, and hasn't any intention of losing a nickel of it.

The Alcohol and Tobacco Tax Division of the Internal Revenue Service also has the added duty assigned to it, as part of the Food and Drug Law administrative and enforcement procedures, of determining what is beer and how it shall be labeled. The field of argument is probably limited on the score of what is beer. It is a beverage obtained from the alcoholic fermentation of malted cereal, usually barley malt to which hops have been added.

Antiquity

Beer shows up in the records of man back as far as 6000 B.C. and it has been used for religious, food, and recreational purposes, depending upon the circumstances and customs, ever since. In brewing modern lager beer, bottom fermentation is employed, which means that yeast settles to the bottom of the tank after the beer has fermented. This green beer is aged one to two months in storage tanks with a temperature near freezing. During storage the beer becomes mature, or clears up and acquires mellowness. Some beers are filtered after being charged with carbon dioxide.

The Alchohol and Tobacco Tax Division held hearings in Washington last March to determine the various views of those interested in this new concentrated process for making beer. At that time, the question was to determine how to tax the brew. This tax collection depends upon where and how it is paid. Without any change in the marketing customs the taxes can be paid at the same rate as always and on the drinking beer instead of the concentrate.

Mr. Robert D. Jolin, Alcohol and Tobacco Tax Division, who was chairman at the hearings, said the next problem to be settled is the labelling. This matter will be taken up at hearings held by the Internal Revenue Service this fall. Then, presentations will be made as to whether to call the beer—in the bottle, can, or on tap for the customer—reconstituted, concentrate with water added, fresh frozen, or plain beer.

Union Carbide has developed a fresh frozen orange juice and is using the same principles with beer. In both cases, orange juice and beer, the company will lease the process for manufacture. This is being done now with the orange juice.

The initial interest in the technique was acquired by Union Carbide from the Commonwealth Enginerring Company of Ohio together with patent rights in the field. Union Carbide then brough the process to the attention of the late Fred Miller, then president of Miller Brewing Company. The two companies pioneered the successful application of the process for beer.

Labor unions of brewery workers have expressed doubts as to the job advantage with the process for concentrating beer. Some workers believe that the new process may lead to a concentration of brewing vats as well as beer. In other words, less breweries would operate and more beer would be shipped in concentrated form. Also, some labor observers believe that levelling peaks and valleys in beer production would have the net result of requiring less workers. These beliefs are conjectures at the moment for the simple reason that a definite pattern for the use of the new process cannot develop until the labelling problem is settled.

Labels

It is possible that the hearings on labelling will reflect the financial interests just as much as the problem of descriptive words on the label, so that the customer will be aware of contents within the can or bottle.

These are some of the problems which confront the Alcohol and Tobacco Tax Division staff of Dwight N. Avis, director, Robert Ritter, Counsel, Ralph Alkire, permissive section, and Robert O. Jolin, basic permit and trade practices.

At the hearings last March, one of the facts to be determined for tax purposes was whether or not a brew made by this process would be beer or distilled spirits. This problem came about because there is a difference in the tax rates between beer and distilled spirits. Spirits are taxed on alcoholic proof per gallon. If the same scale of taxation applied to beer, then the tax per 31-gallon barrel of beer would reach something like forty-five dollars. Without getting too involved the different tax stems from the different uses of distilled spirits and beer.

However, as far as the tax thinking is concerned, any effort to increase the alcoholic content of the liquid from fermented grains either by distillation or freezing is considered as a distilled spirit. A good example, is Applejack, made from distilled cider, but a high-proof drink could also be obtained by freezing cider. If the tax rate were different the distillation process would soon find competition and the federal government less income.

(Continued on page 28)

Picatinny Arsenal Searches Plastics Data; Technical Evaluation Made for Military Needs

THE establishment in 1960 of the Plastics Technical Evaluation Center (PLASTEC) at Picatinny Arsenal, the ammunition and nuclear weapons research and engineering center of the U.S. Army Ordnance Special Weapons-Ammunition Command, gives evidence of the rapidly increasing importance of plastics in military applications.

PLASTEC serves as a clearing house for information on plastics technology for more than 5,500 companies in the United States engaged in the plastices business and the many hundreds of Department of Defense agencies and contractors using plastics products.

Although PLASTEC is interested in the complete range of activities involving plastics—from basic research through fabrication—its main interest is in the types of information likely to be useful to the design engineer. With many different kinds of plastics available—each with its own set of characteristics—and with new plastics appearing frequently, the design engineer needs someone to guide him through this maze and to advise him on which materials fit his specific needs. The lack of standardization in the rapidly shifting field of plastics and the meagerness of information on the properties of many plastics make it especially difficult for the engineer to determine readily which plastic, if any, may suit his purposes. PLASTEC will guide and advise the engineer and devote increasing efforts to the promotion of standards.

Staff of Specialists

PLASTEC's staff consists of well-informed specialists in such fields as packaging, electrical-electronics, structures, and mechanics. These specialists keep abreast of the latest developments in their fields and broaden their knowledge by reading widely in the literature and by making trips to government, university, and industrial research laboratories, material suppliers, designers and manufacturers of end items, and technical society meetings. They ascertain who is working in the various fields and get detailed descriptions of the work being done. They also bring back samples of materials as well as copies of publications—technical reports, unpublished internal reports, data sheets. They also receive proprietary information, not for dissemination to others but for help in solving specific problems.

Government reports and technical journals are carefully reviewed for information related to PLASTEC's fields of interest. This information enters PLASTEC's files in the form of index cards containing extracts of articles which can be drawn on to answer the inquiries which are arriving in growing numbers as PLASTEC's existence becomes better known.

Answers Missing

Answers to inquiries from organizations in all branches of the Defense Department as well as from their contractors or prospective contractors are not always readily available. Sometimes there are no specific answers. The PLASTEC specialist not only draws on his own knowledge but often goes to considerable trouble to dig out information from the technical data in PLASTEC's files or from a literature search to find the answer. He may call on other government laboratories or the resources of an expert at a university or industrial laboratory. He may enlist the services of a sister agency such as the Solid Propellant Information Agency. He may visit one or more plants where comparable problems have arisen. He can consult the staff of the Ordnance Corps Plastics and Packaging Laboratory at Picatinny Arsenal whose scientists and engineers provide a ready source of information since they tackle plastics problems associated with ammunition and nuclear weapons. The accessibility of this Laboratory was one of the important reasons for locating PLASTEC at Picatinny.

Whatever he learns, the specialist then communicates to the inquirer. If there is no complete or specific answer, he plainly says so. He also provides bibliographic references that may be pertinent, sends relevant PLASTEC reports that are available along with extracts of reports from other sources, and mentions the name and location of any experts whom he has not been able to consult but who may possibly furnish additional information.

Plastics Summary

An important aspect of the work of PLASTEC is the preparation of publications summarizing important phases of plastics developments. On some subjects, such as glass-flake laminates, little or nothing may have been previously published. On another topic—like filament winding—a sudden in-

(Turn page)

Deaths

John Parks Coe, a retired vice president of United States Rubber Company, died suddenly at 71 years of age in his Woodbridge, Conn., home. During WW1 he worked on improved gas masks at the U. S. Rubber Company plants in Naugatuck, Conn., and Providence, R. I. In 1953, Mr. Coe handled his company's interests when government owned plants for synthetic rubber production were transferred to private industry. When U. S. Rubber and Texaco, Inc., formed a synthetic rubber company—Texas-U. S. Chemical Co.—Coe was elected chairman of the board. He retired in 1955.

Coe began his schooling in Rock Falls, Illinois where he was born. He graduated from high school in Topeka, Kansas and Washburn College in Topeka. He studied chemical engineering at Massachusetts Institute of Technology, and received a degree as bachelor of Science in 1913. He began his business career with U. S. Rubber at its tire and bicycle tube plant in Indianapolis. He worked in the company laboratories then in New York City and rose to become in charge of tire development. He became a factory manager, divisions sales manager, and general manager of the Naugatuck Chemical Division. He was elected a vice president of the company in 1945.

Grace Emery Fiske died at her home in Montclair, New Jersey, after a short illness. Mrs. Fiske was the wife of Kerby H. Fiske, chairman of the board of Allied Chemical Corporation, and a director in the Washington Post. Mrs. Fiske, who was 56 years of age, was a graduate of Smith College, and wrote children's plays which were produced by the Junior League in Montclair. She was also a member of Alliance Francaise. She is survived by her husband, two daughters, and three grandchildren.

U. S. Rubber Increases Thread Production

U. S. Rubber has doubled its plant capacity at Gastonia, North Carolina, for production of synthetic elastic thread, which came out of 10 years of research in polyurethane chemistry. The thread is marketed as Vyrene, and can be made in many sizes, some almost as fine as human hair. It is reported to have excellent oxidation and chafe resistance and can be drycleaned. The demand began to exceed the supply, William E. Clark, vice president and general manager, explained, when the thread gained acceptance among leading manufacturers of swimwear, and the makers of women's foundation garments and brassieres adopted it in their fall lines. U. S. Rubber is one of largest textile manufacturers in the United States with mills in Burlington, Gastonia, Raeford, N. C.; Scootsville, Va.; Shelbyville, Tenn., and Hogansville, Ga.

Miles Builds Citric Acid Plant in Israel

Miles Chemical Company, a division of Miles Laboratories, is building a citric acid plant with an annual capacity of 1500 short tons near Haifa. Sixty per cent of the capacity is going into internal consumption.

Beer—Continued from Page 26

In the concentrated beer process, beer never goes to the consumer in concentrated form. The beer is reconstituted at normal strength when water is added and it is properly carbonized for packaging. This is one of the reasons the Internal Revenue Service views the results of the freezing process in brewing as a beer.

Today, as over the ages, there are many types and kinds of beers made with different processes and each with its distinctive flavor and body color. Now, something has been added.

Plastics—Continued from Page 27

terest in large rocket motor cases required examination of early data and definition of the gaps still to be filled. PLASTEC's publications are likely to be either state-of-the-art reports or reports on phases of a subject which when integrated constitute a state-of-the-art report. Sources for subjects of reports are those areas identified by specialists in their studies where information is scanty, badly organized or contradictory.

In these various ways PLASTEC carries out its mission of ferreting out the latest developments in plastics, evaluating them for application to military problems, and searching out areas suitable for such applications.

Reports and inquiry service is furnished without cost by PLASTEC to all agencies of the Department of Defense, their contractors and suppliers, those requiring information to become contractors, universities, technical libraries, NASA, and AEC. Unclassified information is made available to the general public through the Office of Technical Services, Department of Commerce, Washington 25, D. C.

Anyone wishing to be placed on the distribution list for PLASTEC reports and services should write to PLASTEC, Picatinny Arsenal, Dover, N. J. A field of interest check list will be forwarded to the requester for completion. After receipt by PLASTEC, a determination will be made as to eligibility to receive reports and services.

Board Reports on Nuclear Blast In Test Reactor at Idaho Falls

Cause Unknown • Trouble With Control Rods • Recommends Changes

THE AEC General Manager's Board of Investigation has made its final report on the Stationary Low Power Reactor (SL-1) accident which took the lives of three military trainees at the Idaho Falls Testing Station.

It is impossible to identify completely or with certainty the causes of the incident, the Board reported. The most likely immediate cause of the explosion appears to have been a nuclear excursion resulting from unusually rapid and extensive motion of the central control rod, the report continued. This supposition is based on the fact that there is little evidence to support any of several other conceivable initiating mechanisms.

Control Rod Experience

It is known, the report stated, that a variety of conditions had developed in the reactor, some having their origin in the design of the reactor and others in the cumulative effects of reactor operation, which may have contributed to the cause and extent of the incident. Among these conditions were the loss from the core of the burnable boron and the condition of the control rods that caused sticking.

From early operations onward, the intermittent and increasing difficulty was encountered in the free movement of the control rods. At least over the first year of operations, and possibly in large measure thereafter, the difficulty arose from the abnormal performance of the seals through which the drive shafts penetrated the rack and pinion gear housing on top of the reactor. The rate of flow of seal water affected the performance of the rod drives, as did the presence of foreign matter. Increased filtration apparently reduced the problems associated with foreign matter. A study was in progress to seek an understanding of the variation of the scram performance of the rods, with seal water flow. This variation was not considered a serious problem, in that performance specifications were met, provided the seal water flow was at the design value. It was also stated that movements imposed in scram tests prior to reactor start-up and frequent exercise of the rods seemed to improve rod performance, possibly by tending to clear out particles of dirt or rust in seals or bearings.

In more recent months, testimony before the Board and operating records indicate increased frequency of malfunctioning of the control rod drives. On the one hand it was postulated by several witnesses that the bowing of the boron strips attached to the fuel elements exerted sufficient lateral force to result in reduction of the clearance within the control-rod shrouds, restricting the free motion of the blades. On the other hand, several witnesses felt there was no evidence for such closing of the shrouds, but that there might be some accumulation of crud on the shroud and the blade surfaces; and that exercising the drives tended to prevent sticking of the rods in the shrouds. It was also indicated that the higher power operation, which took place only after November 1960, and the addition of the cadmium strips required further withdrawal of the control rods than had been previously required. Consequently, the drives were being used in a new region of the mechanical structure, where closer tolerances, or other differences, caused increased difficulties with rod motion.

Positive Factors

The only known interferences within a shroud were:

1. A crimp or similar bend was observed in the top edge of the No. 1 shroud. A special stainless steel wedge-shaped tool was designed and used to straighten out this defect.
2. A dummy control blade, made of aluminum was fabricated for insertion and irridiation in the No. 4 shroud. On initial insertion, the blade could not be fully inserted. The wedge-shaped tool was used on this shroud also, but since it could not be inserted within the shroud, the actual remedy for insertion of the blade was to cut a portion off of the bottom of the blade.

After the incident a review was made of the Operating Logs from September 1, 1960, through December 23, 1960, by members of the Military Cadre.

Night Book

According to testimony presented before the Board, all orders in the Night Order Book, for the instruction of reactor operating personnel, are given

by either the Operations Supervisor, or the Plant Superintendent with the Supervisor's or Assistant Supervisor's concurrence, and the followings orders reflect the efforts of the operations group to maintain the rods in an operable status by frequent exercise: 12-20-60, by the Plant Superintendent—

"Each shift will perform a complete rod travel exercise at approx. 4 hours after the start of shift. This rod exercising will be required of each shift until further notice."

12-21-60 by the Operation Supervisor

"Perform a complete rod travel exercise on the graveyard and subsequent shifts."

12-22-60, by the Plant Superintendent

"Do not perform control rod exercises during 2.56 MW power run." (Testimony indicates that a special power run to get equlibrium data was in progress at this time.)

A review of the Operating Log No. 13 reflects that the aforementioned orders were complied with by the operators. On December 23, 1960, when the reactor was secured, the Operating Log No. 13 includes, in part, the following:

"0825 Dropping rods to secure reactor

Rod drop times

No. 1 no drop
No. 3 dropped ½" and stuck
No. 5 clean drop in 0.82 sec.
No. 7 no drop
No. 9 clean drop in 0.81 sec.

"0827 Driving rods 1, 3, and 7 to zero.

"0830 Controlling bypass steam flow to cool down to 2°F./min.

"0835 Rod. No. 3 dropped from 9" to 0.5 sec. Rod No. 1 dropped from 16" to 9" in 1.3 sec."

Procedures

Testimony indicates that this behavior was worse than usual, and that the Assistant Operations Superintendent remembered commenting that this was probably because of the preceding operation (with no rod exercising). The operating procedures called for "scram-testing" the control rods before and during nuclear start-up of the reactor. Rods were dropped individually from a prescribed height before going critical, and also from another height after achieving operating temperatures and pressure in the reactor vessel. Prescribed times for full insertion were given. If the prescribed times could not be met, reactor operation was not to proceed. Testimony indicates that if a rod did not meet the drop-time criterion, the test was repeated.

Review of the experience with control rod performance indicates that this behavior was probably not as bad as had been experienced on some previous occasions, however.

The Project Manager for Combustion Engineering, Inc. and the CEI Assistant Director of the Nuclear Division testified that they were not aware of any significant difficulty with the operation of the control rods and also were not aware of the entries in the log books over the past several months describing these difficulties.

Reactivity Changes

The design goal for the SL-1 reactor core was operation at design power level (allowing for normal outage) for a period of three years. The boron strips were incorporated in the core design to serve as a burnable poison, the depletion of which would compensate for the burning of fuel. Ideally, such an arrangement would lead to a constant reactivity value for the core (at operating conditions), which would be manifested by a nearly constant position of the banked control rods. In August, 1960, routine inspection of selected fuel elements revealed the extensive loss of boron. The large rate of gain of ractivity was ascribed to this boron loss.

Of greater safety significance (as opposed to interest in the core lifetime only), the greater rate of reactivity gain, and, in fact, the larger amount of reactivity gain, reduced the capability of the control rods to render the core subcritical (decreased the reactivity shut-down margin). From estimates of the worth of the control rods, estimates of the shut-down margin were made. Because of the reduced shut-down margin, resulting from the boron loss, strips of cadmium were inserted in two of the T-rod control shrouds on November 11, 1960.

Combustion Engineering's estimate of the reactivity worth of the boron, at the beginning of core life, was 11 per cent. A rough observation of a 2 per cent gain in reactivity, over that predicted which was attributed to the loss of boron, led to the rough estimate that $2 \div 11 = 18\%$ of the boron originally present was missing from the core (this assumes uniform loss of boron from the core and certain other simplifying postulates concerning local reactivity effects).

Although numerical values for core reactivity, rod worth and shut-down margin are all subject to some uncertainty, in varying degree, depending on physical assumptions, the reactor condition, the calculational method or experimental technique, the available information indicates the following:

1. The initial shut-down margin for the cold reactor was probably somewhat less than intended—maybe approximately 3.5 per cent delta k actual margin versus an estimated 4-6 per cent design margin. The actual margin was considered adequate.

2. The reactor could have been made critical by withdrawal of the central control rod only,

anytime since startup of the reactor.

3. At the time of shut-down on December 23, 1959, the shut-down margin for the cold reactor was probably 2 to 3 per cent, assuming rod worth was essentially unchanged from earlier measurements and calculations. With this assumption, and a similar one regarding rod No. 9 (the central control rod), criticality could be produced by withdrawal of this rod approximately 17 inches from the references zero position. Representative critical rod positions are given in Table 1 below.

Table 1
Representative Critical Rod Positions

Core Exposure Date (MWD)		Conditions	Rods 1, 3, 5, 7 (Inches Withdrawn)	Rod 9
9/16/60	711	407°F, zero power	14.2	14.4
9/16/60	711	2.5 MWt, no xenon	16.6	16.6
9/25/60	736	2.5 MWt, equil. xenon ...	17.8	17.8
11/6 /60	848	2.56 MWt, equil. xenon ..	17.6	17.6
11/15/60		Cadmium sheets inserted		
11/16/60	853	180°, zero power, no xenon	13.2	13.2
12/5 /60	888	2.56 MWt, equil. xenon ..	19.3	19.2
12/23/60	932	2.56 MWt, equil. xenon ..	19.4	19.4

(In the initial critical experiments, with no boron present in the 4 x 4 array of fuel elements and with the side rods fully inserted, criticality was achieved with the central rod 14 to 14.5 inches withdrawn. The small size of this core would increase radial leakage, compared to that for a 40 element core, requiring greater withdrawal for criticality. The addition of cadmium and some boron in the actual core would increase absorption, requiring greater withdrawal for criticality, but would be at least partially offset by the presence of additional fuel. Eight additional bare elements, producing a 6 x 4 array, required insertion of the central rod from 14.5 inches withdrawn to 9.25 inches withdrawn to maintain criticality. These numbers serve to emphasize the uncertainty of the critical rod position in the absence of detailed knowledge of the composition of the core.)

Department of Defense

Although the SL-1 reactor was a part of the program of the Army Reactors Branch, Division of Reactor Development, AEC, for the development of water reactors for military applications, the Department of Defense did not have the responsibility for this reactor, either under license or as a result of transfer of the reactor from the AEC according to the provisions of section 91b of the Atomic Energy Act. Military personnel at the site were either in training or a part of the cadre operating the reactor under the general supervision of Combustion Engineering, Inc. Evidence failed to show that the actions of the operators on duty were in any way different than those prescribed and which had been carried out without incident many times before. The plant superintendent, the chief operators (who also were shift supervisors), the qualified operators and trainees were military personnel who operated the plant around the clock according to the procedures and policies provided by the contractor.

Chairman Curtis A. Nelson, of the Board of Investigation, sent a memorandum to General Manager A. R. Luedecke, AEC, which made specific comments for corrective action which might minimize or preclude similar incidents.

Deficiencies

The Board, Nelson stated, is convinced that there were a number of deficiencies related to the SL-1 reactor, which may or may not have had any relation to the direct cause of the incident, but correction of any one of which might actually have prevented its occurence. We have discussed these in our report. The deficiencies or the measures taken to correct them may be classified as items of:

a. Design, test and operation
b. Organization, training and administration
c. Procedures, policies and standards

As examples of improvements:

a. Appropriate choice and placement of suitable incident monitors (in addition to the one present) might have clearly indicated very soon after the incident the nature and extent of the incident.

b. Clearly assigned, and continuing responsibilities of a "disaster team" might have improved the execution of early attempts to obtain significant data concerning short-lived activities of various samples.

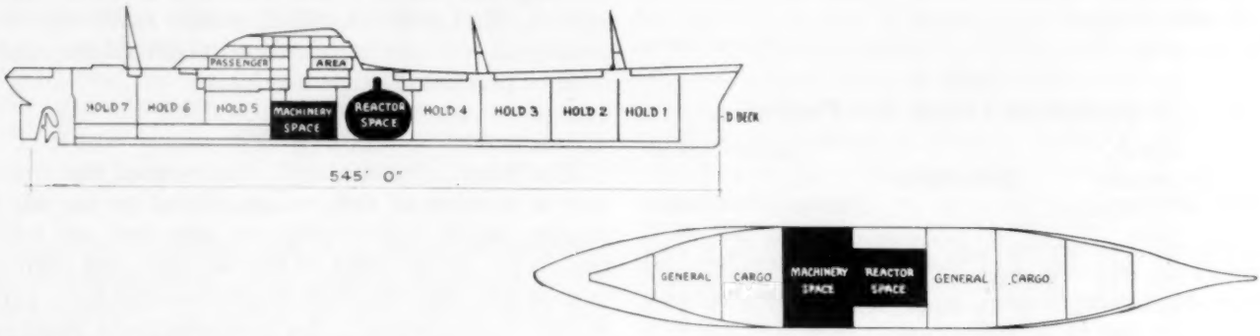
The Board cited these examples to indicate the value of pre-planning in understanding and coping with a similar incident in the future, rather than any attempt at criticism of the action at SL-1.

Sales Exceed Preventative Poultry Feed Output

Merck and Co., is expanding its Elkton, Va., plant for the second time this year to increase production of an additive for poultry feed which contains chemicals to treat and help prevent coccidiosis, a disease of major economic consequence in the poultry industry. The coccidiostat goes to market under the trade name of Amprol. The plant expansion will cost two million dollars, according to James E. McCabe, marketing director for agricultural products of the Merck Chemical Division.

AEC ORDERS REACTOR SHAFTS FOR NUCLEAR SHIP SAVANNAH HARDENED AT HIGHER TEMPERATURES

N.S. Savannah accommodates 60 passengers and 10,000 tons of cargo. She is 595.5 feet overall length, 78 feet beam, draws 29.5 feet and displaces 21,840 gross tons.



Plan view of equipment arrangement within the containment vessel.

THE buffer seal shafts, a part of the control rod drive mechanism, in the nuclear reactor of the **NS Savannah** are to be replaced before the reactor becomes fully critical. Present shafts in the **Savannah** reactor were fabricated at 900 degrees Farenheit and the replacement shafts will be made at 1100 degrees. The added heat fabricates a stronger alloy which is better able to stand the working movements performed by these shafts. There is no conclusive evidence, however, that the shafts cannot be successfully made at 900 degrees under some conditions, but shafts fabricated at the lower temperature have given trouble.

Meanwhile a dummy run, or a non-nuclear test of the reactor system, began early in May and will possibly extend into June. This run will prepare the plant for fuel loading and power operation, while the operating crew prepares with training and procedures.

Replacement of the present shafts will occur at the end of the dummy run, or at the later stage of 10 percent of power testing. This might mean a halt in operations if the new shafts are not fabricated by that time. New shafts are scheduled for delivery early in July and this may coincide with the end of the 10 percent power run.

Shaft Description

These buffer seal shafts measure nine and one-half feet in length and one and one-half inches in diameter. The shafts connect at one end with power from an electric motor and at the other end to the control rods of the reactor. Mechanically, the shafts act as the power train to allow movement of the control rods in or out of the reactor.

Reactor control is maintained with neutron-absorbing control rods made of boron-steel. There are 21 of them in the **Savannah** reactor. Those who work with reactors refer to the shaft-driven control rods as "poison blades," because insertion of all rods at one time will absorb the neutrons coming from the core of the reactor and "poison" or nullify the atomic reaction.

Present buffer seal shafts in the **Savannah** reactor are of 17-4 steel, a trade designation for 17 percent chrome and 4 percent nickel. The same type of shafts made at 900 degrees, existed in nuclear power plant of the Commonwealth Edison Company at Morris, Illinois. Electric power produced by this reactor went into the grid system carrying power to Chicago and neighboring communities. Shafts in this plant had cracked and one broke off entirely under operating conditions.

The buffer seal shafts in the nuclear reactors on the **USS Nautilus** and **USS Skate,** atomic submarines, were fabricated at 1100 degrees Fahrenheit. These reactors are the same type as the one on the **NS Savannah,** and these shafts have operated normally.

AEC held hearings at Germantown, Maryland to determine fabricating requirements and inspection techniques for the buffer shafts in the **Savannah** reactor as a result of the problems encountered in the Commonwealth Edison plant at Morris, Ill.

Make Tests

On all replacement shafts for the **Savannah,** AEC has decided, non-destructive examination will be done throughout the manufacturing process. The original raw material has been ultrasonically and magnetic-particle inspected. These inspections will be repeated before chrome plating and again after final grinding. After completion of production of at least 23 shafts, a representative shaft from the remainder will be destructively examined, AEC stated. Ends from at least four shafts will be cut off during production for destructive metallographic examination.

In addition to the 21 shafts installed at present in the **Savannah** service head and scheduled for replacement, the following shafts are available for non-destructive and destructive testing. The designations H900, H1025, etc., denote different age hardening temperatures:

2	**Savannah**	H900 spares.
2	"	H900 Prototype shafts.
2	"	H1100 Full-size test shafts
2	"	H900 Reference standards.
1	"	H1100 Wear test shaft.
32	"	H1100 Replacement shafts.

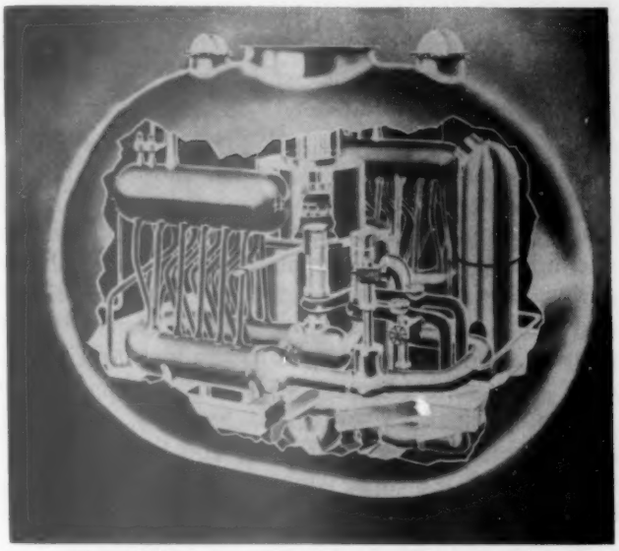
These shafts are available for laboratory testing, in addition to the installed 21 **Savannah** shafts. This listing does not include similar 17-4 shafts which are also being processed for other purposes, from which added useful data may be obtained.

Personnel Training

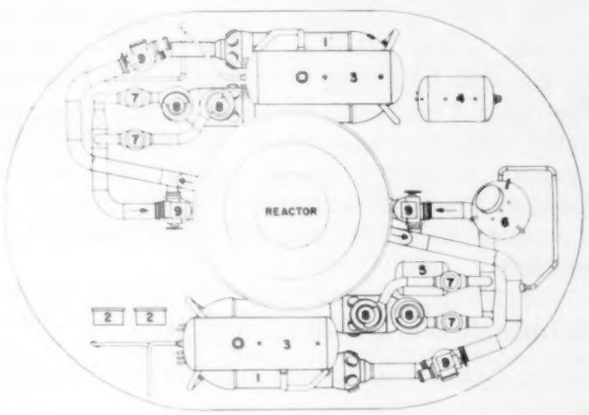
The training program for the **Savannah** was initiated in September 1958 at Lynchburg, Virginia, with academic and reactor experiment training provided by Babcock and Wilcox Company and Lynchburg College. Babcock and Wilcox had been awarded the contract for development and fabrication of the reactor for $9,872,000, in April 1957.

Academic training included nuclear engineering, health physics and reactor design. Two training tools were a full scale simulator of the reactor console and a full scale mock-up of the reactor containment vessel and primary system. Following this, all trainees were given actual reactor operating maintenance experience at several land-based reactor sites including the large ship reactor prototypes at the National Reactor Testing Station, Idaho, the Army's Medium Power Plant at Fort Belvoir, and the Hanford production reactors, plus tours of duty aboard nuclear submarines.

Twenty-one licensed marine engineers and six senior deck officers have been trained under this program. An additional ten engineers from private shipyards, ship operating firms and the Coast Guard received the initial academic and field training, as did seven engineers from four foreign countries. Twenty-six nuclear and maritime engineers from nine maritime countries spent three months on the **Savannah** during construction and at AEC and con-



The shielding and containment vessel houses the pressurized water reactor and all other primary components that will be radioactive. In the center is the reactor and its primary shield tank. Spider-like units are the heat exchangers (bottom) and steam drums (top). The bullet shaped unit at the right is the pressurizer, which maintains the primary system at a constant pressure of 1750 psi. The primary piping is shown between the reactor, pumps and boilers. The entire containment vessels shown here is covered with a six-inch layer of lead and a six-inch layer of polyethylene.



1 Heat Exchanger **2 Let Down Coolers**

3 Steam Drum **4 Condensing Tank**

5 Cont. Drain Tank **6 Pressurizer**

7 Check Valve **8 Pump** **9 Gate Valve**

(Continued on Page 34)

Books

Biochemists' Handbook edited by Cyril Long of the Royal College of Surgeons of England. Published by D. Van Nostrand Company in 1192 pages from the compilations of 171 contributors from 18 different nations, where each writer is acknowledged expert in his field. The book presents in a concise form a wide range of biochemical data. So far as the publisher is aware this information has never been previously bound between covers in the English language. There are six main sections: 1. chemical data; 2. individual enzymes; 3. metabolic pathways; 4. chemical composition of animal tissue and body fluids; 5. chemical composition of plant tissues, and 6. physiological, including nutritional data. The book contains information of particular use to biochemists, chemists, botanists, chemical pathologists and physiologists. The book presents facts as they are most widely accepted at the moment. Price $25.

Colorimetric Methods of Analysis by Foster D. Snell, Ph.D., presents a record of colorimetric and photometric methods of organic analysis that have appeared in literature during the past seven years. The book covers in detail thousands of organic determinations. 576 pages. Price $12.75. Published by Van Nostrand.

N-Butyl Alcohol Bulletin has been released and is free of charge from U. S. Industrial Chemicals Co., Division of National Distillers and Chemical Corporation.

Consumers of Abundance a paper by Gerard Piel presents an interesting and informative view on present day economic values. It is a study and disclosure of economic change worth readying. Published by the Study of Democratic Institutions at Santa Barbara, California. It is only 10 pages in length.

Data Sheets #559 and #560 dealing with sulfonates and plasticizers are available from Chas. Pfizer & Co., Inc.

Catolog of Biochemicals, including rare sugars, amino acids and derivatives is available from Pfanstiehl Laboratories, Waukegan, Illinois.

Alcohols, Acids and Anhydrides, and Aldehydes are three separate booklets now available from Union Carbide without charge. The booklet on alcohols covers physical properties, proprietary solvents, and applications of alcohols. The other two booklets describe properties and uses of Acids and Anhydrides and Aldehydes.

Correction

The May-June Journal erred on page 30 by describing Simon Askin as a director of American Potash and Chemical Corporation and Jamieson Pharmacal Company. Mr. Askin hasn't been associated with American Potash for some years, and Jamieson, as such, is out of business. The story on Askin which appeared on page 19 was correct. He is president of the Heyden Newport Chemical Corporation.

Standard Oil to Help Produce Man-Made Fibers

Amoco Chemicals Corporation and Algemene Kunstzijde Unie N. V. have formed a company to manufacture dimethyl terephthalate, a raw material for polyester yarns, at Delfzijl, Holland. Amoco is a wholly owned subsidiary of Standard Oil of Indiana and AKU (the Dutch Company) currently manufacturers and markets polyester fibers and yarns.

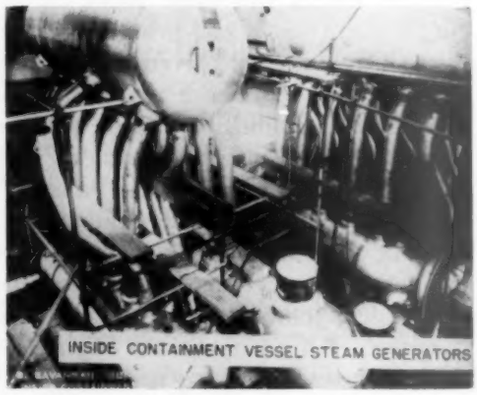
Savannah—Continued from Page 33

tractor facilities associated with the nuclear merchant ship program.

Fuel Use

The **Savannah** reactor is an advanced design pressurized water type with fuel elements enriched to about four percent uranium 235. Estimated fuel range is 300,000 nautical miles over a period of 3.5 years without refueling. During that time only 57.6 kilograms of the initial uranium 235 fuel will be actually consumed, and valuable radioisotopes and plutonium can be reclaimed from the spent fuel.

The **NS Savannah** was built and launched at the Camden, New Jersey yard of the New York Shipbuilding Corporation for a price of $20,908,774.



AIR FORCE BASIC RESEARCH SEEKS CHEMICAL LONGSHOTS

The management of basic research in chemistry is described by the Air Force as the intelligent placing of two dollar bets on longshots as compared with applied research where larger bets are placed on favorites. The Air Force has limited amounts of money to spend in supporting research projects, and is legally limited to the support of research oriented toward Air Force interests. A handicapper's guide, then, is a valuable indicator for making value judgments on the quality of research, and for selecting that portion of good research most closely related to Air Force objectives. The fundamental tool is the Research Planning Objective, and there are six of these covering six technical program areas. These six areas will all contain chemical problems, and the six areas are:

1. PROPULSION

   Energy sources, Energy Release and Transformation, Conversion to Useful Work, and Theoretical and Experimental techniques.

2. MATERIALS

   Internal Structure and Properties of Matter, The Structure and Properties of Interfaces, New Synthetic Methods, and Theoretical Experimental Techniques.

3. ELECTRONICS

   Particle Physics, Interactions of Fields of Matter, Transfer of Electromagnetic Energy, and Information Complexes.

4. GEOPHYSICS

   Planetary Studies, The Lower Atmosphere, The Upper Atmosphere, Space Environment, and Theoretical and Experimental Techniques.

5. BIOSCIENCES

   The Human Organism, Human Performance, Human Tolerance Limits, Theoretical and Experimental Techniques.

6. AEROMECHANICS

   Properties of the Flow Field, Mechanics of Flight, Theoretical and Experimental Techniques.

Air Force Contracts noted as basic chemistry are listed below, as follows:

ORGANIC CHEMISTRY

CONTRACTOR	TITLE	PRINCIPAL INVESTIGATOR
Aeronautical Research Lab. WADC, Wright-Patterson Air Force Base, Ohio	Perarylated Silanes	L. Spialter
Aeronautical Research Lab. WADC, Wright-Patterson Air Force Base, Ohio	Separation Techniques	J. Radell
Aeronautical Research Lab. WADC, Wright-Patterson Air Force Base, Ohio	Tertiary Amines and Derivatives	L. Spialter
Anderson Chemical Co. Weston, Mich.	Preparation of Organic Compounds	A. R. Anderson
Armour Research Foundation Chicago, Ill.	Radiation-Induced Cross Fluorination	P. Y. Feng
Atlantic Research Corp. Alexandria, Va.	Reactions of Alkyl Radicals	J. B. Levy
Battelle Memorial Institute Columbus, Ohio	Mechanism of Thermal Degradation of Perarylated Metalloidal and non-Metallic Elements of Row 3 of the Periodic	A. Levy
California University Berkeley, Calif.	Molecular Orbital Correlations in Organic Chemistry	A. Streitwieser
California University Berkeley, Calif.	Spectra of Free Radicals and Unstable Intermediates	G. C. Pimentel
Chicago University Illinois	Radiation Damage to Organic Materials	W. G. Brown
College of Puget Sound Tacoma, Wash.	Reactions of Methylene Peroxide Derivatives	R. D. Sprenger
Colorado University Boulder, Colo.	Thermo- and Photo-Chemistry of Organic Halogen Compounds	J. R. Lacher, J. D. Park
Columbia U., New York	Chemical Bond Energies	B. P. Dailey
Continental Oil Co. Ponca City, Okla.	Development of Diesters with Improved Thermal and Hydrolytic Stability	A. M. Durr
Copenhagen University Denmark	Experimental Tests of Quantum Mechanical Theory	B. Bak
Denver Research Institute Colorado	Alkylaromatic Compounds as Radiation Resistant Fluids	J. J. E. Schmidt
De Paul University Chicago, Ill.	Nitrogen and Sulfur Groups Attached to the same Carbon Atom	E. Lieber
Electronic Material Sciences Lab. Air Force Cambridge Research Center, Mass.	Radiation Induced Coloration of Insulator Plastics	B. Manning
Florida University Gainesville, Fla.	Cyclic Polymerization	G. B. Butler
Florida University Gainesville, Fla.	Intra- and Inter-Molecular Polymerization	G. B. Butler

People—

Dr. Lee S. Harrow, Manager of the Analytical Division of the Philip Morris Research Center in Richmond, Va., and veteran of service with the United States Naval Reserve (1943-1952), has been elected Chairman of the Virginia Section of the American Institute of Chemists. Former manager of Thiokol Chemical Corporation's Washington, D. C. office. **Mr. J. M. Gardiner** has been appointed assistant to the President representing Thiokol's over-all operations in the Washington area. **John G. Metzoff** is transferring from The Dow Metal Products Company, a division of Dow Chemical, to head a Technical Service and Development group in the Dow Chemical Company's new Metals Department. **John J. Hronas** has been appointed to the position of group leader in the Chemical Research and Development Department of Hagan Chemicals & Controls, Inc. **Chester L. Jones,** director of sales, resin products, has been promoted to assistant director of marketing for Monsanto Chemical Company's Plastics Division; and **Edmond S. Bauer,** product administrator, resins and coatings, has been promoted to replace Jones. **Dr. A. L. McCloskey** has been appointed to the newly created position of associate director of market development and technical service of United States Borax & Chemical Corp.; Doctor McCloskey served in the U. S. Navy. **Milton E. LeFevre,** formerly director of purchases for the Midland Division of The Dow Chemical Company, has been named manager of purchases—packaging, a newly created position in the Corporate Purchasing Department. **Dr. Ernest C. Pollard,** chairman of the department of biophysics at Yale University, has been named professor of biophysics at the Pennsylvania State University, effective July 1. **Dr. Nicholas Fuschillo** has been appointed head of the Solid State Physics Section of Melpar, Inc., Falls Church, Va. **Norman R. Haugen** has been appointed to the technical sales staff for the Chicago area, by Central Solvents and Chemicals Company, member firm of the Solvents and Chemicals Group.

CONTRACTOR	TITLE	PRINCIPAL INVESTIGATOR
Florida University Gainesville, Fla.	Synthesis of Semi-Inorganic Flourine Polymers	H. Brown
Fordham University New York	Chemistry of Sydnones	I. M. Hunsberger
General Electric Co. Schenectady, N. Y.	Fundamental Research in Polymeric Bonding	J. R. Elliot
George Washington Carver Foundation, Tuskegee Inst., Ala.	Fluoralkyl Thioethers	C. T. Mason
Harvard University Cambridge, Mass.	Organometallic Compounds of the Group III Elements	F. G. A. Stone
Heidelberg University Germany	Preparation of Sulphur-Phosphorus-Nitrogen Polymers	M. Goehring
Illinois Inst. of Tech. Chicago	Syntheses with Carbides	S. I. Miller
Illinois University Urbana	Metaly Alkyls	T. L. Brown
Johns Hopkins University Baltimore, Md.	Spectral Studies of Free Radicals and Reactive Molecule at 4°K	D. W. Robinson
Kentucky University Lexington	Chemistry of N-Sulfinyl Amines	W. T. Smith
Leicester University Great Britain	Chemical Reactivity of the Aryl-Silicon Bond	C. Eaborn
Los Angeles State College California	Chemical Effects of Ultrasonic Waves	D. L. Currell
Maryland University College Park	Electron Spin Resonance of Free Atoms and Radicals	R. S. Anderson
Maryland University College Park	Interaction of High Energy Radiation with Organic Materials	G. F. Woods
Massachusetts University Amherst	Chemistry of Hydrazine Derivatives	L. A. Carpino
Minnesota University Minneapolis, Minn.	Paramagnetic and Nuclear Resonance Studies of Free Radicals	J. E. Wertz
National Bureau of Standards Washington, D. C.	Radiation Chemistry of Polymers and Monomers	L. A. Wall
New Hampshire University Durham	Organoboron Chemistry	H. G. Kuivila
New York University New York	Preparation and Properties of Mono- and Dialkyl Aluminum Hydrides	C. J. Marsel
Northwestern University Evanston, Ill.	Nuclear Irradiation Studies on Polymers	M. Dole
Notre Dame University Indiana	Radiation Damage to Metalloidal- and Metal-Organic Materials	M. Burton
Ohio State University Columbus	Structures of Nitro Aromatic Compounds	P. M. Harris
Ohio State University Research Foundation, Columbus	Synthesis of Highly-Hindered Aliphatic Compounds	M. S. Newman
Oklahoma A. and M. College Stillwater	New Synthetic Methods and Chemical and Physical Properties of Aromatic Sulfonamides	M. T. Edminson
Olin Matheison Chemical Corp. Baltimore, Md.	Nitrogen-Containing Heterocyclic Fluid Systems	E. H. Kober
Overberger, C. G. Brooklyn, N. Y.	New Synthetic Methods for Polymers and Fluids	C. G. Overberger
Pennsylvania State University University Park	Effects of High Energy Nuclear Radiation on Paraffinic Hydrocarbons	L. A. Currie
Pennsylvania State University University Park	Reversibility of Radical-Olefin Reactions	P. S. Skell
Pennsylvania State University University Park	Structures of Complex ions and Their Salts with Organic Bases	R. Pepinsky
Pennsylvania State University Philadelphia	Thermostability of Porphyrins	J. F. Hazel
Pittsburgh University Pennsylvania	Structure of Crystalline Hydrates of Organic Molecules and Ions	G. A. Jeffrey
Purdue Research Foundation Lafayette, Ind.	Ferrocene and Related Compounds	R. A. Benkeser
Purdue Research Foundation Lafayette, Ind.	Reaction of Ambident Anions	N. Kornblum
Purdue Research Foundation Lafayette, Ind.	Nucleophilic Addition	W. E. Truce
Reaction Motors, Inc. Rockaway, N. J.	Synthesis of High Hemperature Stable Organo-Phorphorus Derivatives	M. Cohen
Sheffield University Great Britain	Halogenation of Aliphatic Hydrocarbons and Derivatives thereof	J. M. Tedder
South Carolina University Columbia	Reactions of Free Radicals with Aromatic Rings	D. F. de Tar
Stanford Research Institute Menlo Park, Calif.	Ablation of Polymeric Materials	F. R. Mayo
Stanford University California	Electronic Structure and Chemical Reactivity	T. R. Tuttle
Technical University Norway	Molecular Structure Investigations	O. Bastiansen
Tufts University Medford, Mass.	Reaction Intermediates in the Ozonation of Alkenes	F. L. Greenwood
Universitets Kjemiske Institute Norway	Molecular Structures	O. Hassel
University College London, Great Britain	Rearrangement of Hydrazobenzenes	E. D. Hughes
University of S. California Los Angeles	Chemistry of Thioperoxides	N. Knarasch
University of S. California Los Angeles	Stereochemistry of Additions to Double Bonds	J. A. Berson
Washington State College Pullman	Pyrolysis of Esters	G. G. Smith
Washington University St. Louis, Mo.	Paramagnetic Resonance of Free Radicals	R. Norberg
Wisconsin University Madison	Stereochemistry of Organosilicon Compounds	R. West
Wyandotte Chemicals Corp. Michigan	Cross-Linking Mechanism Research	K. L. Paciorek
Yale University New Haven, Conn.	Cleavage Reactions of Disubstituted Carbon Compounds	J. English
Yale University New Haven, Conn.	Radiation Damage to Organic Materials	R. H. Bretton
Copenhagen University Denmark	Application of the Theory of Irreversible Processes to Problems of Diffusion and Chemical Reaction	T. A. Bak
Cornell University Ithaca, N. Y.	Inelastic Molecular Collisions	B. Widom

John R. Van Wazer has been transferred from Monsanto Chemical Company's Inorganic Chemicals Division to its Research & Engineering Division at St. Louis. **Paul H. Lelong** has been appointed to the perfumery staff of the Colgate-Palmolive Company's Research and Development Department. **Earle B. Barnes** has been promoted to general manager of the Texas Division of The Dow Chemical Company at Freeport, Texas. **John K. Boykin** has been appointed Southeastern District Manager for Allied Chemical's National Aniline Division. **Dr. Charles E. Crompton** is chief of the Martin Company's new department of nuclear chemistry. **Dr. Luther S. Roehm** has been elected vice president for marketing of the Merck Chemical Division by the Board of Directors of Merck & Co., Inc. **Dr. C. W. Hinman** has been appointed technical director of the Research Laboratories of Pitman-Moore Company, a division of The Dow Chemical Company. **Dr. Herbert C. Wohlers** has been appointed Director of Research & Development-Chemicals and Dyestuffs for Allied Chemical's National Aniline Division. **Dr. Irving Roberts,** Reynolds Metals Company's director of corporate planning, has been elected a vice president by the board of directors. **Charles M. Doscher** has been appointed general sales manager, European area, for Dow Chemical International Limited S.A. **James Zisson** has been appointed manager of supply and transportation of Amoco Chemicals Corporation. **A. G. Lambertsen** has been appointed general sales manager for industrial chemicals of Amoco Chemicals Corporation. **Robert G. Capell,** formerly an Associate Administrative Fellow at Pittsburgh's Mellon Institute, has joined the Technical Development Section of Gulf Oil Corporation's Petrochemical Department. **John E. Cordes** has been appointed technical representative for the marketing department of United States Borax & Chemical Corporation. **James C. Kellogg III** was elected a Director of De Laval Steam Turbine Company.

CONTRACTOR	TITLE	PRINCIPAL INVESTIGATOR
Electronic Material Sciences Lab. Air Force Cambridge Research Center, Mass.	Catalysis as a Means of Investigating Defect Solid State	J. Rohan
Electronic Material Sciences Lab. AFCRC, Mass.	Determination of Enthalpies from 0° to 1500°C	N. Pickering
Electronic Material Sciences Lab. AFCRC, Mass.	Surface Treatment by Radiation Generated Reactive Chemical Species	I. Feuer
Electronic Material Sciences Lab. AFCRC, Mass.	Thermodynamic Properties of Intermetallic Compounds	M. Brooks
Evans Research and Development Corp., New York	Basic Theory of Surface-Free Energy of Metals and Polymers	W. E. Holland
Florida State University Tallahassee	Spin-Orbital Perturbations in Molecules	M. Kasha
Free University of West Berlin Germany	Calculation of Collision Cross-Section	G. Ludwig
General Dynamics Corp. San Diego, Calif.	Interaction of Hydrogen and Oxygen Atoms with Surfaces	W. L. Fite
General Electric Co. Schenectady, N. Y.	Development of a Research Tool to Measure Energy of Adhesion	F. F. Carini
General Electric Co. Schenectady, N. Y.	Metal Thin Film Formation and Structure	C. Neugebauer
General Mills, Inc. Minneapolis, Minn.	Surface Phenomena Study with Electron Mirror Microscopy	R. J. Nowicki
Illinois University Urbana	Films of Surface Active Substances on a Metal Surface	H. A. Laitinen
Illinois University Urbana	Study of Surface Physics with Radioactive Substances	H. Frauenfelder
Imperial College of Science and Tech. London, Great Britain	Adsorption Phenomena on Ionic Adsorbents	F. D. Tompkins
Indiana University Bloomington	Electrochemistry of Fused Salts	R. L. Seifert
Indiana University Bloomington	Quantum Mechanical Studies of the Nature and Interactions of Simple Atoms and Molecules	H. Shull S. A. Hagstrom
Instituto de Quimica Fisica Spain	Dehydration of Isopropyl Alcohol	J. F. Garcia de la Blanda
Instituto de Quimica Fisica Spain	Kinetics of Sulfuration of Metallic Surfaces	J. L. Mari
Iowa State College Ames	Heat Capacity Lag in Gases	S. Legvold
Johns Hopkins University Baltimore, Md.	Crystalline and Liquid State Calorimetry	D. H. Andrews
Johns Hopkins University Baltimore, Md.	Hot Atom Chemistry	W. S. Koski
Kent State University Ohio	Electrolytes in Pure Acetic Acid	R. T. Meyers
Lehigh University Bethlehem, Pa.	Collodial Phenomena Relating to the Formation and Stability of Gel Systems	J. J. Chessick
Little, Arthur D., Inc. Cambridge, Mass.	Determination of the Molecular Weights of Heavy Polymers	N. M. Widerhorn
Maryland University College Park	Intermolecular Forces	E. A. Mason
Mellon Inst. of Industrial Research, Pittsburgh, Pa.	Special Statistical Problems in Rheology and Physical Chemistry	B. D. Coleman
Minneapolis-Honeywell Regulator Co., Minnesota	Properties of Clean Surfaces	S. R. Morrison
Minnesota University Minneapolis, Minn.	Kinetics of Labile Intermediates Produced by Flash Photolysis	R. Livingston
North Carolina State College Raleigh	Lubrication Behavior of Liquid Metals	P. H. McDonald
Northwestern University Evanston, Ill.	Diffusion in Heterogeneous Catalysis	R. I. Burwell
Oregon University Eugene	Molecular Complexation and Reactions of non-polar Molecules at Polarizing Surfaces	L. H. Klemm
Pennsylvania State University University Park	Study of Metal Surfaces by the Field Emission Microscope	E. W. Mueller
Pennsylvania University Philadelphia	Mechanism of the Hydrogen Evolution Reaction	J. Bockris
Polytechnic Inst. of Brooklyn New York	Adsorption of High Polymers	F. R. Eirich
Polytechnic Inst. of Brooklyn New York	Frequency Response of the Adsorption on Solid Catalyst	L. M. Naphtali
Polytechnic Inst. of Brooklyn New York	Momentum and Energy Transport Processes in Liquids	F. C. Collins
Polytechnic Inst. of Brooklyn New York	Research and Development of High Energy Atoms and Molecules	R. A. Marcus
Princeton University New Jersey	Intermolecular Forces in Liquids and Solids	C. P. Smyth
Princeton University New Jersey	Kinetics of Ozone Oxidations	D. Garvin
Princeton University New Jersey	Photonometric Titrations	C. E. Bricker
Quantum, Inc. Wallingford, Conn.	Preparation and Study of Polymer Films Adhering to Metals	C. M. Doede
RCA Labs Div., Radio Corp. of America Princeton, N. J.	Crystal Field Theory	D. McClure
Rensselaer Polytechnic Inst. Troy, N. Y.	Ionic Nature of Molten Salts	C. Janz
Rochester University New York	Photochemistry in the Liquid and Solid Phases	W. A. Noyes
Royal Inst. of Tech. Sweden	Hydrolysis Equilibria of Ions	L. G. Sillen
Rutgers University New Brunswick, N. J.	Photothermography Mechanisms	P. A. Van Der Meulen
Rutgers University New Brunswick, N. J.	Thermal Stability of Various Slightly Soluble Salts	E. R. Allen
Stanford Research Inst. Menlo Park, Calif.	Photochemical Production of Hydrogen	A. J. Marcus
Stanford Research Inst. Menlo Park, Calif.	Mechanism of Evaporation of Fused Salts	D. Cubicciotti
Stanford Research Inst. Menlo Park, Calif.	Use of High Temperature Reactions for the Synthesis of Compounds with Great Thermal Stability	D. M. Chamberlain
Syracuse University New York	Molecular Vibrations in Liquids	E. Fishman
Texas University Austin	Wave Functions for Group I Atoms and Certain of their Ions	C. W. Scherr
Tufts University	Spectroscopic Investigation of	K. Wilson

Bruce Minteer has been appointed President Los Angeles chapter of the Institute of Environmental Sciences. The Institute is a national group composed of more than 1,000 engineers active in the environmental testing procedures with emphasis on the problems of equipment and human survival in space. Minteer is National Field Sales Manager for Endeyco Corporation of Pasadena, California. **Emil A. Wich** has been appointed manager-Technical Service and Development at Collway Pigments Division of General Aniline & Film Corporation. **Dr. Ernest M. Weber** has been elected vice president-research and development for Chas. Pfizer & Co., Inc. Other Pfizer moves include, **Dr. K. J. Brunings** has been appointed administrative director, Groton Laboratories; **Dr. G. D. Laubach,** director of medicinal chemicals research, **Dr. G. M. Shull,** director of fermentation research, **Dr. I. A. Solomons,** director of chemotherapeutic research, **R. J. Taylor,** director of chemical products and development, and **R. M. Rees, M.D.,** director of clinical research. **William G. Allen** has been appointed services superintendent of Monsanto Chemical Company's Inorganic Chemicals Division Monsanto, Tenn., plant. Other Monsanto moves include: at the company's Inorganic Chemicals Division Monsanto, Tenn., plant: **Ray E. Witter** appointed maintenance superintendent; at the Chocolate Bayou Project, Alvin, Tex.: **Fred Applegath, Roy L. Grantom, John S. Hearn, Jack D. Shurden,** and **Claude W. Smalling** have all been appointed members of the systems studies group; appointed also at the Chocolate Bayou Project, Alvin, Tex., have been: **J. W. Barton** as plant accountant, **John S. Putnam** as general superintendent of maintenance, **R. William Rotzler** as general superintendent of technical services, **Hans G. Schleicher** as general superintendent of production, and **William S. Sevier** as general superintendent of distribution; **Verlin A. Lauher** has been appointed group leader of systems studies in the engineering department at the Chocolate Bayou Project.

CONTRACTOR	TITLE	PRINCIPAL INVESTIGATOR
Medford, Mass.	Solid State Surfaces Containing Adsorbed Molecules	V. Crawford
University College London, Great Britain	d-Atomic Orbitals in Covalent Bond	D. P. Craig
University of Southern California Los Angeles	Radiation Effects on the Surface of Solids	A. W. Adams
University of Southern California Los Angeles	Thin Liquid Films	K. J. Mysels
Uppsala University Sweden	Quantum Theory of Many Particle Systems	P. O. Lowdin
Varian Associates Palo Alto, Calif.	Study of Chemisorption by Magnetic Absorption	L. H. Piette
Washington University Seattle	Catalysis, Adsorption, and Solution	G. D. Halsey

PHYSICAL AND CHEMICAL METHODS OF ANALYSIS AND MEASUREMENT

CONTRACTOR	TITLE	PRINCIPAL INVESTIGATOR
Advanced Development Lab. Rome Air Development Center, N. Y.	Microsocpic Resonance	I. Gordy
Advanced Development Lab. Rome Air Development Center, N. Y.	Microsocpic Resonance	C. Mollenhauer
Aeronautical Research Lab. WADC, Wright-Patterson Air Force Base, Ohio	Analytical Chemistry of Special Alloying Metals	R. W. Moshier
Akron University Ohio	Infrared Spectral Line Intensities	H. M. Hanson
Arkansas University Fayetteville	Atomic Spectroscopic Investigation of Nuclear Properties	R. Hughes

INORGANIC CHEMISTRY

CONTRACTOR	TITLE	PRINCIPAL INVESTIGATOR
Aberdeen University Great Britain	Structural Chemistry of Silicates and Related Subjects	H. F. W. Taylor
Aeronautical Research Lab. WADC, Wright-Patterson Air Force Base, Ohio	Ceramic and Metal Ceramic Systems	B. C. Weber
Aeronautical Research Lab. WADC, Wright-Patterson Air Force Base, Ohio	Mechanisms of Oxidation of Boron and Silicon-Boron Mixtures	H. F. Rizzo
Aeronautical Research Lab. WADC, Wright-Patterson Air Force Base, Ohio	Mechanism of Slip-Casting Powders	B. C. Weber
Aeronautical Research Lab. WADC, Wright-Patterson Air Force Base, Ohio	Mechanism of Surface Resistance to Corrosive Media	B. C. Weber
Aeronautical Research Lab. WADC, Wright-Patterson Air Force Base, Ohio	Mechanism of the Stablization of Zirconia	R. Ruh
Alabama U., University	Niobium and Related Elements	J. L. Kassner E. L. Grove
Alfred University New York	Grain size Effects on the Thermal Conductivity of Ceramic Oxides	J. R. Tinklepaugh
Alfred University New York	Properties of Oxides as a Function of Composition	T. J. Gray
Antioch College Yellow Springs, Ohio	Aqueous Solutions near their Critical Temperatures	J. T. Corwin
Armour Research Foundation Chicago, Ill.	Alkali Metal Ozmates	F. Schossberger
Battelle Memorial Institute Columbus, Ohio	Determination of Heat of Formation of SiC	H. Goerring
Boston University Massachusetts	Reactions of "Active Nitrogen"	N. N. Lichtin
Boston University Massachusetts	Structure of Boron Compounds	K. Eriks
California University Berkeley	Ductile Ceramics	E. R. Parker
California University Berkeley	Internal Stresses in Ceramic Bodies	J. A. Pask
California University Los Angeles	Structure of Perchlorate Ions in Different Crystalline Environments	K. N. Trueblood
Douglas Aircraft Co., Inc. Long Beach, Calif.	Effects of Surface Conditions and Environments in Deformation of Ceramics	G. R. Pulliam
Eastern Nazarene College Wollaston, Mass.	Reactions of Aluminum Borohydride	P. C. Maybury
General Elecrtic Co. Schenectady, N. Y.	Deformation of Refractory Compounds	J. E. Burke
George Washington University Washington, D. C.	Reactions Between Alkali Metals and Carbon	W. F. Sager T. P. Perros
Illinois Institute of Technology Chicago	Silicon and Germanium Hydrides	S. Sujishi
Illinois University Urbana	Electrochemistry of Rare Earth and Thorium Salts	T. Moeller
Johns Hopkins University Baltimore, Md.	Boron Hydride Chemistry	W. S. Koski
Massachusetts Institute of Technology, Cambridge	Thermodynamic Properties of Mg-GROUP IVb Compounds	M. B. Bever
Michigan University Ann Arbor	Sintering of Metal Oxides	G. Parravano
Milan University Italy	Rhenium and Iridium Compounds	L. Malatesta
National Bureau of Standards Washington, D. C.	Particle-Impact Processes for Applying Ceramic and Cermet Coatings	W. N. Harrison

Guy F. Benjamin, Jr. appointed maintenance superintendent of Monsanto's Inorganic Chemicals Division Trenton, Mich.; **Earl R. Billen** appointed maintenance superintendent of the Inorganic Chemicals Division Carondelet, Mo.; **Raymond J. Fogerty** has joined the personnel department of Monsanto Chemical Company's Organic Chemicals Division John F. Queeny Plant at St. Louis. **R. L. Beam,** executive vice president and operating head of Hazeltine Electronics Division, has been elected as an executive vice president of Hazeltine Corporation. **Alvin M. Weinberg,** director of Oak Ridge National Laboratory, has been elected a member of the Physics Section of the National Academy of Sciences. **Major General Walter K. Wilson, Jr.,** was nominated to be chief of Army Engineers and for promotion to the grade of lieutenant general; he succeeds **Lieutenant General Emerson C. Itschner** who retired 31 March. **Lt. Col. Nora G. Springfield** received the JAG insignia and detail in the Judge Advocate General's Corps, being the first Woman's Army Corps officer to be so detailed since World War II. **Dr. Robert M. Hexter,** Senior Fellow of Mellon Institute, Pittsburgh, has received a Guggenheim Fellowship and a Fulbright grant to do research at the Israel Institute of Technology (Technion), Haifa, for the academic year 1961-62. Dr. Jules D. Porsche, formerly director of the Central Research Department and Assistant to the Vice President of Armour and Company, has entered private practice in Chemistry with offices at 138 Oxford Avenue in Clarendon Hills, Ill. **Walter R. Beardsley,** president of Miles Laboratories, Inc., was elected chairman of the board, succeeding Charles S. Beardsley who will continue as honorary chairman. **Dr. Zachary D. Sheldon,** formerly manager, Advanced Materials Development, General Engineering Laboratory, General Electric Company, Schenectady, New York, has joined The Carborundum Company as associate director of the Research and Development Division. **Jacob J. Janzen** and **D. Wayne Hallstein** were elected as additional executive vice presidents for Ingersoll-Rand Co.

CONTRACTOR	TITLE	PRINCIPAL INVESTIGATOR
National Bureau of Standards Washington, D. C.	Plastic Deformation Phenomena in Polycrystalline Ceramics	J. B. Wachtman
New York University New York	Chalcopyrites Class of Intermetallic Compounds	I. Cadoff
New York University New York	Preparation of Ultra-Pure Materials by Means of Specific Hydride Reactions	W. Brenner
New York University New York	Reaction Rates Between Refractory Oxides and Graphites	K. Komarek
Northwestern University Evanston, Ill.	Kinetics of Metallic Oxide Reactions	D. H. Whitmore
Northwestern University Evanston, Ill.	Properties of Oxides as a Function of Composition	D. H. Whitmore
Northwestern University Evanston, Ill.	Synthesis, Properties and Reaction Mechanism of Platinum Metal Compounds	F. Basolo
Ohio State University Columbus	Volume Stresses Associated with Microscopic Particles in Ceramics and Cermets	T. E. Shevlin
Ohio State University Research Foundation, Columbus	Solid-Vapor Equilibria in the Rare Earth-Rare Earth Metal Systems	D. White
Oklahoma A. and M. College Stillwater	Vaporization Phenomena at High Temperatures	R. D. Freeman
Pennsylvania State University University Park	Chemistry of Boron Compounds	T. Wartik
Purdue University Lafayette, Ind.	Thermodynamics and Electro chemistry of Technetium	J. W. Cobble
Stanford Research Institute Menlo Park, Calif.	Mechanical Properties of Ceramics and Intermetallic Compounds	W. D. Suislay
Uppsala University Sweden	Crystal Chemistry of the Solvates of Arsenic Chloride and Phosphorus and Selenium Oxy-chlorides	I. Lindquist
Utah University Salt Lake City	Chemical Kinetics of Boron Hydride Reactions	G. R. Hill
Utah University Salt Lake City	Development of Theoretical Basis for Heterogeneous Nucleation of Ice Crystals on Foreign Substances	F. S. Harris
Washington State College Pullman	Reactions of Nitryl Halides	H. H. Batey
Washington University Seattle	Boron and Silicon Chemistry	D. M. Ritter

PHYSICAL CHEMISTRY AND CHEMICAL PHYSICS

CONTRACTOR	TITLE	PRINCIPAL INVESTIGATOR
Aeronautical Research Lab. WADC, Wright-Patterson Air Force Base, Ohio	Investigation of Metallic Surface Properties Using Polarization Capacitance	A. B. Johnson
Aeronautical Research Lab. WADC, Wright-Patterson Air Force Base, Ohio	Liquid-Phase Thermal Diffusion	J. A. Bierlein
Aeronautical Research Lab. WADC, Wright-Patterson Air Force Base, Ohio	Transport Properties and Thermodynamics of Liquids	J. S. Dahler
Alfred University New York	Defect Solid State and Catalysis	T. J. Gray
Armour Research Foundation Chicago, Ill.	Effect of Radiation on Catalysts for Organic Reactions	P. Y. Feng
Baylor University Waco, Tex.	Electrochemistry of Titanium	T. C. Franklin
Brigham Young University Provo, Utah	Rhenium Catalysis	H. S. Broadbent
Brown University Providence, R. I.	Intermolecular Forces in Liquids and Solids	R. C. Cole
Brown University Providence, R. I.	Viscosity of Gasses at High Pressures and Temperatures	J. Kestin
Bureau of Mines Bartlesville, Okla.	Thermodynamics of Fuorocarbons	J. P. McCullough
California University Riverside	Thermodynamics of the Liquid-Liquid Critical Mixing Region for Several Binary Systems	H. H. Schmidt
Cambridge University Great Britain	Thermal Diffusion in Electrolyte Solutions	J. N. Agar
Catholic U. of America Washington, D. C.	Electrochemical Properties of Metal-Hydrogen Alloys	G. W. Castellan
Catholic U. of America Washington, D. C.	Structure, Spectra and Kinetics of Molecules	V. Griffing
Chicago University Illinois	Methods of Calculating the Properties of Molecules and Radicals	C. C. J. Roothaan
Chicago University Illinois	Rate and Mechanism of Recombination of Molecular Fragments on Surfaces	F. F. Ricke
Colorado University Boulder	Viscoelastic Properties of Polymer Solutions and Gels	S. J. Gill
Arkansas University Fayetteville	Experimental Development of a New Method for Measuring Surface Roughness on a Microscopic Scale	M. K. Testerman
Baird-Atomic, Inc. Cambridge, Mass.	Two-Beam IR Interferometry	J. G. N. Braithwaite
Battelle Memorial Inst. Columbus, Ohio	Infrared Absorption Spectra of Selected Aromatic Compounds	C. D. Smith
Birmingham University Great Britain	Structure of Molecules by Microwave Spectroscopy	J. Sheridan
Catholic U. of America Washington, D. C.	Infrared Molecular Spectroscopy	K. F. Herzfeld
Central State College Wilberforce, Ohio	MicroDetermination of Organic Fluorine	B. H. Johnson
Centre National de la Recherche Scientifique France	Vacuum Ultra-Violet Spectrographic Investigation of Gaseous Impurities in Metals	B. Vodar
Columbia University New York	Paramagnetic Resonance Spectra of Free Radicals	G. K. Fraenkel
Columbia University New York	Physics and Chemistry of Gases at High Temperatures	P. Kusch
Columbia University New York	Electron Spin Resonance in Gases	G. K. Fraenkel
Cornell University	Analytical Applications of Flame	W. D. Cooke

Companies

Awarding of final contract for construction of a new styron production plant in Leghorn, Italy, has been announced by **Dow Chemical International Limited S. A.**

The manufacturing facility will be built by Foster Wheeler Italiana of Milan. The plant will consist of polymerization units, coloring facilities, quality control laboratories and technical service facilities.

The plant will be operated by Dow Chimica Italiana S.p.A., a wholly-owned Dow subsidiary, and will manufacture a wide range of polystyrene.

According to Max Key, operations vice president of Dow Chemical International, completion of the initial production capacity is scheduled for mid-1962. Total capacity will reach 16,000 tons per year.

Raymond Duddleston is project manager for the new unit with responsibility for supervision of engineering, construction and start-up operations.

Technicolor, Inc., has acquired The Hartley Company in exchange for an undisclosed number of shares of Technicolor common stock.

The Hartley Company, headquartered in Pasadena, is the largest manufacturer of ball point pen cartridges. It also is engaged in chemical research and the design and manufacture of automated machinery.

Callery Chemical Company has moved its Encino (Calif.) laboratories and offices to larger quarters at Van Nuys.

Recruiting of chemical, textile, electrical and mechanical engineers is under way by **Allied Chemical's National Aniline Division.**

The job openings are at Columbia, S. C., where a new fine denier nylon plant is under construction, and Hopewell and Chesterfield, Va.

Write P. R. Dept. 46, Allied Chemical's National Aniline Division, 40 Rector Street, New York 6, N. Y.

Melpar, Inc., has delivered a data processing system, occupying more space than a basketball court, to the Air Force.

CONTRACTOR	TITLE	PRINCIPAL INVESTIGATOR
Ithaca, N. Y.	Spectroscopy	
Cornell University	Atomic Phenomena Occurring on and Near the Surface of Solids	B. M. Siegel
Ithaca, N. Y.		
Cornell University	Solute Species in Concentrated Aqueous Solutions	R. A. Plane
Ithaca, N. Y.		
Cornell University	Vaporization Processes at High Temperature	R. F. Porter
Ithaca, N. Y.		
Dayton University	Application of Ion-Exchange Method for Accuracy of Analysis of Alloys	S. L. Eveslage
Ohio		
Duke University	Microwave Spectra and Magnetic Resonance in Strategic Substances	W. Gordy
Durham, N. C.		
Electronic Components Lab.	Rotation and Vibration Energy Levels of Systems of Atoms	L. Politzer
WADC, Wright-Patterson Air Force Base		
Ohio		
Florida State University	NMR Study of the Structure and Reactivity of Molecules	R. A. Kromhout
Tallahassee		
Georgia Institute of Technology	Mass Spectrographic Study of Ion-Molecule Reactions	E. McDaniel
Atlanta		
Huffman Microanalytical Labs.	Applicability of Pyridylazonaphthol as a Spectrophotometric Reagent in the Analysis of Newer Alloying Metals	E. W. D. Huffman
Wheatridge Colo.		
Illinois University	New Spectrochemical Methods	H. V. Malmstadt
Urbana		
Indiana University	Spectrometric Studies of Fast Reactions	E. J. Bair
Bloomington		
Johns Hopkins University	Micro-Catalytic Chromatography	P. H. Emmett
Baltimore, Md.		
Johns Hopkins University	Post-Discharge After-Glow Spectroscopy	D. E. Kerr
Baltimore, Md.		
Johns Hopkins University	Theoretical Interpretation of Infrared Spectra	W. S. Benedict
Baltimore, Md.		
Kansas University	Photometric Titration of Organic Groups	C. A. Reynolds
Lawrence		
Kent State University	Proton-Proton Separations in Hydrates	J. McGrath
Ohio		
Laval University	Chemical Reactions in an Electrical Discharge	P. A. Giguere
Canada		
Liege University	High Resolution Infrared Studies	M. V. Migeotte
Belgium		
Liege University	Nuclear Quadrupole Resonance in Solids	J. Duchesne
Belgium		
Massachusetts Inst. of Tech.	Far Infrared Spectra of Organic Molecules	R. C. Lord
Cambridge		
Mellon Inst. of Industrial Research	High Resolution Infrared Spectroscopy of Solids	R. M. Hexter
Pittsburgh, Pa.		
Miami University	Stucture of Liquids by X-Ray Diffraction	H. Ritter
Oxford, Ohio		
Michigan University	Multiple-Beam Infrared Interferometry	C. W. Peters
Ann Arbor		
Minnesota University	Polarography and Amperometry in Non-Aqueous Solvents	I. M. Kolthoff
Minneapolis		
National Bureau of Standards	Color and Chemical Constitution of Dyes	J. H. Gould
Washington, D. C.		
National Bureau of Standards	High Resolution Flame Studies	E. K. Plyler
Washington, D. C.		
New York University,	Low-Frequency Absorption Spectra	Y. Beers
New York		
North Carolina University	Metal Ion Interaction with Complexing Agents	C. N. Reilley
Chapel Hill		
Ohio State University	Atmospheric Infrared Studies	H. H. Nielsen
Columbus		
Ohio State University	Far Infrared Spectroscopy	E. E. Bell
Columbus		
Penn. State University	Spectroscopic Instrumentation	T. K. McCubbin
University Park		
Pittsburgh University	Pressure Broadening of Infrared Spectral Lines	W. M. Benesch
Pennsylvania		
Purdue University	Coordination Kinetic Chromatography	D. W. Margerum
Lafayette, Ind.		
Rutgers University	Nuclear Magnetic Resonance Investigation of the Properties of Matter	H. C. Torrey
New Brunswick, N. J.		
Southern Research Inst.	Infrared Spectra of Certain Classes of Aromatic Compounds	W. S. Wilcox
Birmingham, Ala.		
Stanford University	Chemical Applications of Nuclear Magnetic Resonance	R. A. Ogg
California		
Stanford University	Paramagnetic Resonance	G. E. Pake
California		
Stanford University	Structure of Liquids	C. J. Pings
California		
Sylvania Electric Products, Inc.	Developing a Method of Analyzing Concentrations of Impurities in Silicon Carbide	G. Morrison
Bayside, N. Y.		
Texas A. and M. Research Foundation	Nuclear Magnetic Resonance Studies of Binary Solutions	M. Eisner
College Station		
Texas A & M. Research Foundation; College Station	Vibrational Structure of the Electronic Spectra of Molecules	J. B. Coon
Texas Univesity	High Pressure Effects on Electronic Spectra	W. W. Robertson
Austin		
Thermal Radiation Lab.	High Resolution Molecular Studies	J. S. Garing
Air Force Cambridge Research Center, Mass.		
Thermal Radiation Lab.	Infrared Vibration-Rotation Band Measurements	B. Schurin
AFCRC, Mass.		
Thermal Radiation Lab.	Spectroscopy of High Temperature Gases	G. W. Wares
AFCRC, Mass.		
Washington University	Electron Cynamics in Complex Molecules	W. T. Simpson
Seattle		
Washington University	Spectra of Radicals and Complex Molecules	P. Cross
Seattle		
Weizmann Inst. of Science	Kinetics of Exchange Reactions by NMR	S. Meiboom
Israel		
Wisconsin University	Change Transfer Complexes	E. M. Kosower
Madison		
Wuerzburg University	Energy Transfer in Organic Molecular Compounds	G. Briegleb
Germany		
Yale University	Atomic Beam Magnetic Resonance Experiments in Metastable and Excited States	V. W. Hughes
New Haven, Conn.		

Allied Chemical will become the first American company to supply both principal components of urethane plastics, in July. This marks the beginning of commercial production of polyethers at the Solvay Process Division's Baton Rouge, La., plant. Initial capacity will be 20 million pounds per year.

Dr. Robert H. Reed, Vice President-Development for Solvay, states that the Baton Rouge plant will make propylene oxide-based polyethers by a new and improved process based on a unique reactor design, following four years of research, process development, and field testing. National Aniline's Application Research Laboratory at Buffalo, N. Y., and Solvay's Research Department, Syracuse, N. Y., are cooperating in developing many types of polyethers.

The **Carborundum Company,** one of the world's leading abrasive manufacturers, and its subsidiary, Pacific Abrasive Supply Company, which formerly operated separate office and warehouse facilities in the Los Angeles area, have moved their offices and stocks to a new $1½ million Abrasive Service Center at 2240 South Yates Avenue, Los Angeles, Calif.

A new refinery in Argentina to produce high-octane gasoline and benzene will be designed and constructed by **Hydrocarbon Research, Inc.,** of New York, in cooperation with Minera Aluminé of Buenos Aires. Minera Aluminé, which will participate with Hydrocarbon in the engineering and construction of the new refinery, is an Argentine corporation with diversified industrial interests.

The refinery is being built for Yacimientos Petroliferos Fiscales of Argentina, a government-owned corporation and largest petroleum producing and refining enterprise.

The new $15 million refinery will be located at San Lorenzo, about 200 miles northwest of Buenos Aires, is planned to make the country self-sufficient in benzine. Naphthas to be processed in the plant will come from Y.P.F.'s refineries in San Lorenzo and Campo Duran.

GROUP AND SUSTAINING MEMBERS

OF THE ARMED FORCES CHEMICAL ASSOCIATION

Abbott Laboratories, North Chicago, Ill.
Adache Associates, Inc., Engineers, Cleveland, Ohio
Aerojet General Corporation, Downey, Calif.
Aircraft Armaments, Inc., Cockeyville, Md.
Air Reduction Company, Inc., New York, N.Y.
Allied Chemical Corporation, New York, N.Y.
American Cyanamid Company, New York, N.Y.
American Potash & Chemical Corporation, 300 West Sixth St., Los Angeles 54, Calif.
American Zinc, Lead & Smelting Co., St. Louis, Mo.
Analytic Services, Inc., 5202 Leesburg Pike, Alexandria, Va.
Armstrong Cork Company, Lancaster, Pa.
Astra Pharmaceutical Products, Inc., Worcester 6, Mass.
Atlas Chemical Industries, Inc., Wilmington, Delaware.
Avco Corporation, 750 Third Ave., New York 17, N.Y.
Barnebey-Cheney Company, Columbus, Ohio
Bechtel Corporation, San Francisco, Calif.
Beckman Instruments, Inc., 2500 Harbor Boulevard, Fullerton, Calif.
Blaw-Knox Company, Pittsburgh, Pa.
Booz-Allen Applied Research, Inc., 4921 Auburn Ave., Bethesda, Md.
Brothers Chemical Company, 575 Forest St., Orange, N.J.
Brown Company, 150 Causeway St., Boston, Mass.
Casco Products Corporation, Bridgeport, Conn.
Celanese Corporation of America, New York, N.Y.
Chase Manhattan Bank, The, 20 Pine Street, New York, N.Y.
Columbia Southern Chemicals—Chemicals Division of Pittsburgh Plate Glass Company, One Gateway Center, Pittsburgh 22, Pa.
Commercial Solvents Corporation, New York 16, N.Y.
Continental Oil Co., Ponca City, Okla.
Controls for Radiation, Inc., 130 Alewife Brook Parkway, Cambridge 40, Mass.
Diamond Alkali Company, Cleveland, Ohio
Dow Chemical Company, Midland, Mich.
E. I. duPont de Nemours & Co., Inc., Wilmington, Del.
Edo Corporation, College Point, N.Y.
Engelhard Industries, Newark, N.J.
Esso Research and Engineering Co., Linden, N.J.
Ethyl Corporation, Baton Rouge, La.
Evans Research & Development Corp., New York, N.Y.
Federal Laboratories, Inc., Saltsburg, Pa.
Ferguson, H. K., Company, The, Cleveland, Ohio
Ferro Corporation, Cleveland, Ohio
Firestone Rubber and Latex Division of Firestone Tire & Rubber Co., Fall River, Mass.
First National City Bank, 55 Wall St., New York 15, N.Y.
Fisher Price Toys, Inc., East Aurora, N.Y.
Fisher Scientific Co., New York, N.Y.
Fluor Corporation, Lt., The, Whittier, Calif.
Food Machinery & Chemical Corporation, New York, N.Y.
Fraser & Johnston Co., San Francisco, Calif.
General Aniline & Film Corporation, New York, N.Y.
General Electric Company, Chemical & Metallurgical Division, Bridgeport, Conn.
General Tire & Rubber Company, The, Wabash, Ind.
Goodrich, B. F., Chemical Company, Cleveland, Ohio
Harshaw Chemical Company, The, Cleveland, Ohio
Harvey Aluminum, Torrance, Calif.
Hercules Powder Company, Wilmington, Del.
Heyden Newport Chemical Corporation, New York, N.Y.
Hoffman-La Roche, Inc., Nutley 10, N.J.
Hooker Chemical Corporation, Niagara Falls, N.Y.
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International Nickel Co., Inc., New York, N.Y.
International Salt Co., Inc., Scranton, Pa.
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Koppers Company, Inc., Pittsburgh, Pa.
Lambert-Hudnut Mfg., Laboratories, Inc., Lititz, Pa. subsidiary of Warner-Lambert Pharmaceutical Company, St. Louis, Mo.
Eli Lilly and Co., Indianapolis 6, Ind.
Little, Arthur D., Inc., Cambridge, Mass.
Lummus Company, The, 385 Madison Ave., New York 17, N.Y.
The Martin Company, Baltimore 3, Md.
Melpar, Incorporated, 3000 Arlington Blvd., Falls Church, Va.
Merck & Company, Inc., Rahway, N.J.
Millmaster Chemical Corporation, 99 Park Ave., New York 16, N.Y.
Mine Safety Appliances Co., Pittsburgh, Pa.
Monsanto Chemical Company, St. Louis, Mo.
National Lead Co., 111 Broadway, New York 6, N.Y.
Niagara Blower Co., New York, N.Y.
Olin Mathieson Chemical Corp., 10 Light St., Baltimore, Md.
Pemco Corporation, Baltimore, Md.
Pennsalt Chemicals Corporation, Philadelphia, Pa.
Pfizer, Chas. & Company, Inc., Brooklyn, N.Y.
Pfaudler Company, a Division of Pfaudler Permutit, Inc., Rochester 3, N.Y.
Phillips Petroleum Company, Bartlesville, Okla.
Pittsburgh Chemical Co., Pittsburgh, Pa.
Pittsburgh Plate Glass Company—Chemical Division (Columbia Southern Chemicals) One Gateway Center, Pittsburgh 22, Pa.
Procter & Gamble, Cincinnati, Ohio
Riegel Paper Corporation, 260 Madison Ave., New York 16, N.Y.
Shell Chemical Corp., Denver, Colo.
Shell Development Company, Emeryville, Calif.
Sheller Mfg. Co., Dryden Rubber Div., Chicago, Ill.
Shwayder Bros., Inc., Denver, Colo.
Standard Chlorine Chemical Company, Inc., South Kearney, N.J.
Standard Oil Company (Indiana), Chicago, Ill.
Stauffer Chemical Company, New York, N.Y.
Sun Oil Company, Philadelphia, Pa.
Union Carbide Corporation, New York, N.Y.
United-Carr Fastener Corp., Cambridge, Mass.
United States Borax & Chemical Corp., 630 Shatto Place, Los Angeles 5, Calif.
Universal Match Corp., Ferguson, Mo.
Vitro Corporation of America, New York, N.Y.
Vulcan-Cincinnati, Inc., 120 Sycamore St., Cincinnati 2, Ohio
Wigton-Abbott Corporation, 1225 South Avenue, Plainfield, N.J.
Wyandotte Chemicals Corp., Wyandotte, Mich.

Companies listed in bold face type are Sustaining Members

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Procurement Seminar on Chemical Research and Development

16th annual meeting

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